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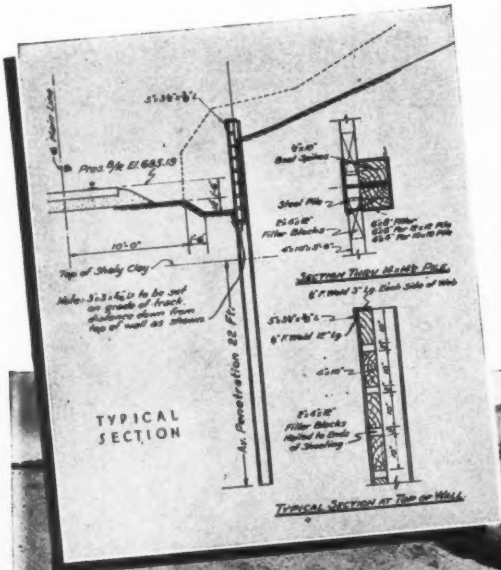
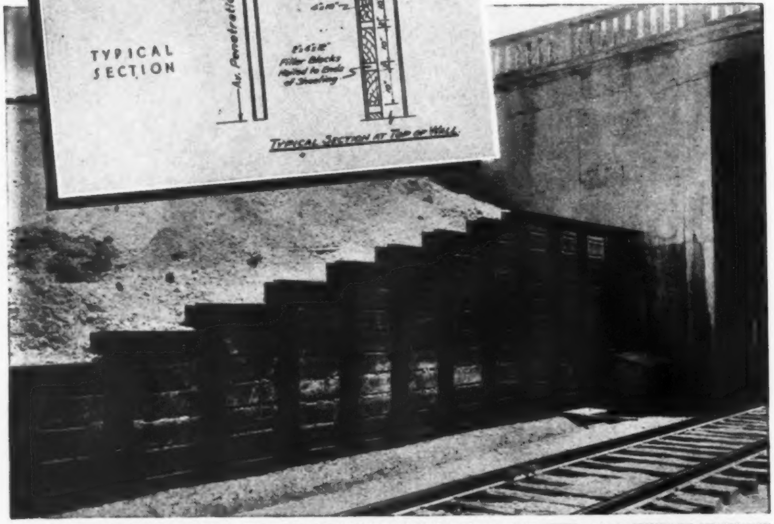
A New Fast Way to Build a *Low-Cost* RETAINING WALL



Wing Wall adjacent to over-pass. Photograph below illustrates how easily U·S·S Bearing Pile construction is adapted to increased height of retained earth. The piles used here were spaced 4 ft. o.c. and vary from 14" x 14½" x 103 lb. per ft., 39 ft. long to 12" x 12" x 65 lb. per ft., 32 ft. long.



Clean-cut economical construction. In the 375 ft. of wall north of over-pass, U·S·S Bearing Piles 12" x 12" x 53 lb. per ft., 29 ft. long are spaced 5 ft. o.c. The creosoted sheeting, 4" x 10" is separated by 2" x 4" x 12" separator blocks and backed up by creosoted filler blocks set vertically against pile web and flange as illustrated in the pile cross-section to the left. Complete length of retaining wall 797 ft. overall.

Here, construction with U·S·S Steel Bearing Piles provides efficient, economical, right-of-way protection!

SIMPLICITY is the keynote of this easily erected and versatile retaining wall construction. Designed and constructed under the supervision of G. L. Staley, Bridge Engineer, and under the direction of F. Ringer, Chief Engineer of the Missouri-Kansas-Texas Railroad. Illustrations show its application where the main line track runs adjacent to a sharp slope through the Big Cut in the city of San Antonio.

In addition to its comparatively low cost, it has the special advantage that it can be erected in quick time and with no interruption of traffic, for it does not require excavation on the track side of the wall for spread footing and also eliminates the considerable excavation behind the wall usual with ordinary construction.

The U·S·S Bearing Piles which form a steel backbone for the wall, acting as cantilevers, take the entire thrust of the slope. They are driven in lengths from 29 ft. to 39 ft. to an average penetration of 22 ft. into the shaly clay and stiff clay bottom. Piles are increased in length and weight, and are set on closer centers as the height of retained earth increases.

In this instance, creosoted wooden sheeting was used between the piles, but this construction is equally adaptable to the use of precast concrete slabs, poured concrete or steel plates.

U·S·S Steel Bearing Piles are the strongest, most permanent, most easily driven form of pile you can use. They are available from an unfailing source of supply that makes them immediately obtainable regardless of the size or location of the job.

U·S·S STEEL BEARING PILES

CARNEGIE-ILLINOIS STEEL CORPORATION

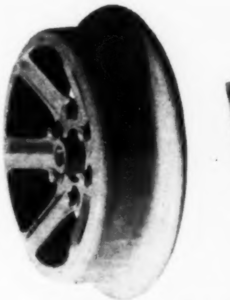
Pittsburgh *Chicago*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* United States Steel Products Company, New York, *Export Distributors*

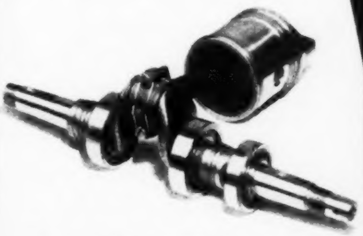
UNITED STATES STEEL

Years Ahead in Design

FAIRMONT CARS HAVE THE FEATURES WHICH SERVE YOU BEST

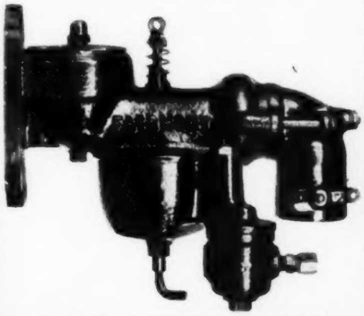


A few sizes of Fairmont bolted demountable tires, instead of 100 or more sizes of complete wheels, meet all replacement requirements on motor, hand and push cars.



The crankshaft assembly of Fairmont roller bearing engines can be serviced in the field instead of in the shop. The inner and outer races of each of the three Fairmont Hy-Load roller bearings are separable—which permits easy take-down and assembly.

When replacements of Fairmont endless cord belts finally become necessary, they can be made easily; and only a few sizes are required for all cars in service. Endless Cord Belts can also be installed in older cars.



Two sizes of carburetors fit all models of Fairmont cars from the earliest to the latest model. Many of the separate parts of both carburetors are interchangeable. Such simplification greatly simplifies servicing.

Performance ON THE JOB COUNTS

Fairmont INTERCHANGEABLE PARTS
1. REDUCE REPAIR COSTS
2. KEEP EQUIPMENT MODERN

When you specify Fairmont Motor Cars for your road you effect important economies not only in operation but in overhead charges. For you have less capital invested in stocks of repair parts.

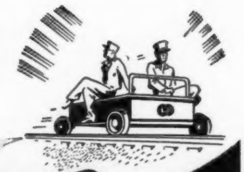
The Fairmont policy of designing for interchangeability and standardizing replacement units so that they can be used in many different types of cars minimizes stocks, greatly simplifies replacements and provides an easy way to keep older cars modern. Most of the wearing parts are used in several models of cars having different seating and load capacities.

Ask about the greater economy of Fairmont cars today! Fairmont Railway Motors, Inc., Fairmont, Minnesota.

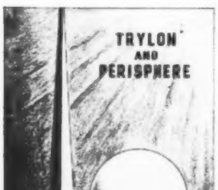
OF ALL THE CARS IN SERVICE TODAY

MORE THAN HALF ARE FAIRMONTS

THE BEARINGS THESE HUGE LOCOMOTIVES USE ARE THE BEST FOR YOUR SECTION CARS



New York Central's new streamlined 20th Century Limited.
Locomotive and cars equipped with TIMKEN Bearings.



Be sure and see the TIMKEN exhibit in the Metals Building at the New York World's Fair.

The phenomenal performance of TIMKEN Bearings on American railroads—in locomotives, passenger cars and streamlined trains—is the strongest evidence of their superiority for section car service.

Section motor cars and trailers equipped with these bearings are faster, safer, more dependable and more economical to operate. Friction is eliminated. There is *no wear on car axles* as all moving contact takes place within the bearing itself. Radial, thrust and combined loads are carried simultaneously and safely at all speeds. Lubrication is required only at long intervals.

These advantages mean maximum section car availability with minimum upkeep cost. It will pay you to have them in your new section car equipment. Specify TIMKEN Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; TIMKEN Rock Bits; and TIMKEN Fuel Injection Equipment.

TIMKEN
TAPERED ROLLER BEARINGS

TO RAILWAY SUPPLY MANUFACTURERS

Where An Order Starts

"Bill, how is it that you're not getting anywhere with the .... railroad? I rode over that line last week and every gang I saw was equipped with our competitor's tools."

"I know it, Boss, and I've been trying to find out what happened, for I've been calling on the chief engineer of that road for years."

"What did you find out?"

"Nothing until last week and then his chief clerk opened up and told me the story."

"I suppose he told you the other fellow used a traffic club or had a bigger allowance for entertainment."

"Not a bit of it, but it's a long story."

"Well, let's have it."

"Well, Boss, it starts with a section foreman on a branch line way out west.* He saw an advertisement of the .... Company's device in *Railway Engineering and Maintenance* and was so struck with it that he asked his roadmaster to get one for him."

"And I suppose he got it."

"He did not. The roadmaster turned him down, for they weren't standard on the road. But, Boss, do you know what that foreman did?"

"What did he do?"

"He sent a money order to the editor of that paper, asking him to buy one of those devices for him."

"And did he get it?"

"He certainly did but not the way he expected it. The editor told the chief engineer of this road about the check that he had received and this engineer was so struck with his foreman's earnestness that he sent him the tool he wanted, and returned his check."

"But that's only one foreman and every gang I saw had them."

"That's the interesting part of the story. The chief clerk told me that the chief engineer had never seen any merit in these devices and had turned down the .... Company's salesmen just as he'd turned me down time after time until this check showed up. But this foreman's enthusiasm got him interested and when he investigated these devices again, he was convinced that they're worth while and started buying them until his chief clerk says that they now have more than a thousand on the road."

"And a track foreman started all of these sales?"

"That's right, Boss."

"Well, you don't expect that we can afford to call on all the foremen in the country."

"I know we can't, but there's a way to reach them."

"How's that?"

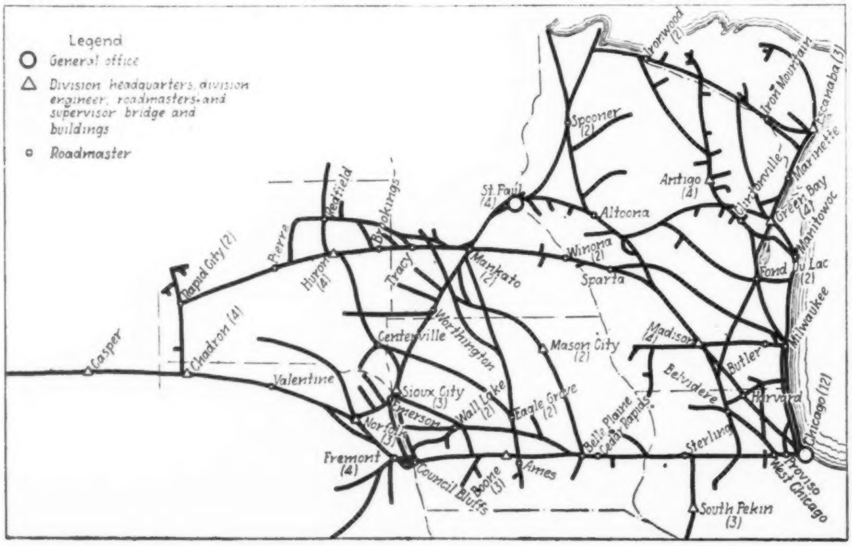
"The way the .... Company did—by advertising in *Railway Engineering and Maintenance.* That magazine goes to several thousand of the more alert foremen throughout the country—and you don't want to forget that they're the kind of foremen that'll be the roadmasters and supervisors of tomorrow."

"Bill, there may be something to your idea."

"I know there is, Boss—and don't forget that that magazine goes to all of the supervisors, division engineers and higher maintenance officers also."

"I see it. We can't tell where an order may start but we can cover the entire field in that magazine. We'll do it."

*A true story of an actual occurrence.



★

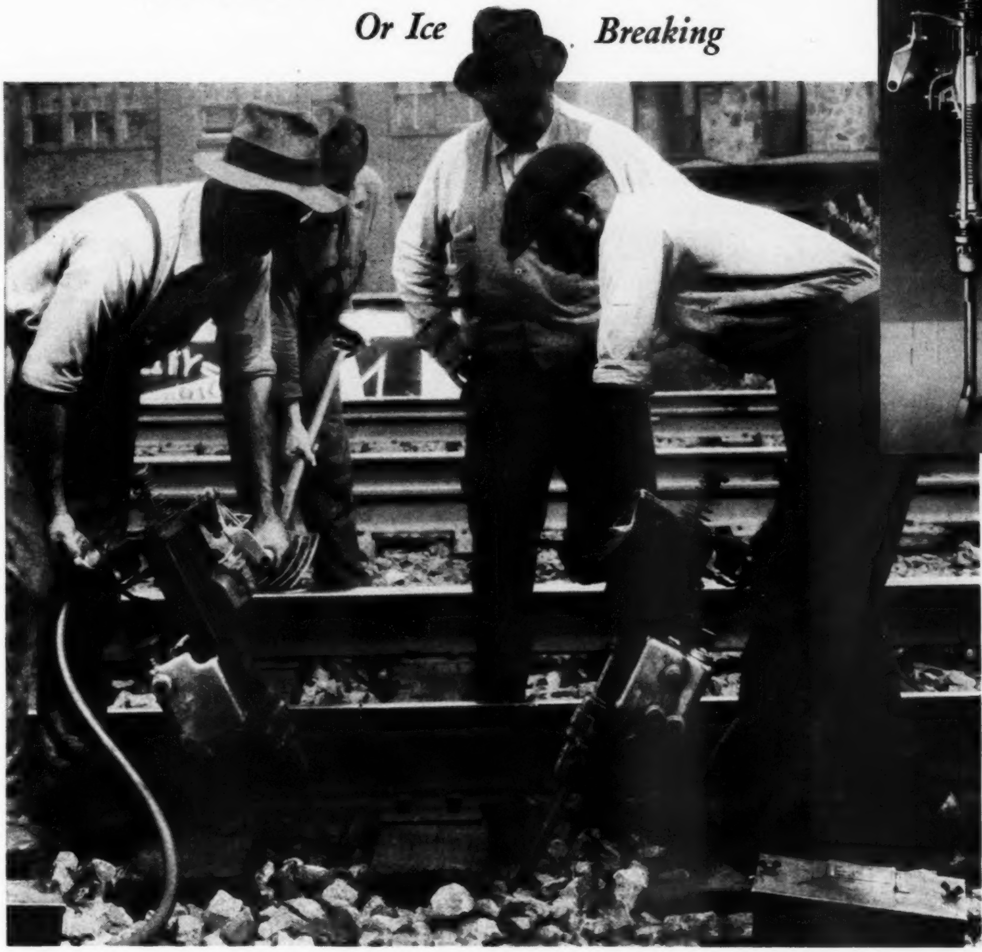
Railway Engineering and Maintenance Goes Every Month to 100 Supervisory Maintenance Offices on the Chicago & North Western System, Located in **2 General Offices, 11 Division Headquarters, and 36 Other Supervisory Headquarters** Scattered All the Way from Escanaba, Mich., to Casper, Wyo. This Magazine Also Goes to 181 Other Subordinate Officers Who Are in Training for Promotion to Supervisory Positions on These Lines.

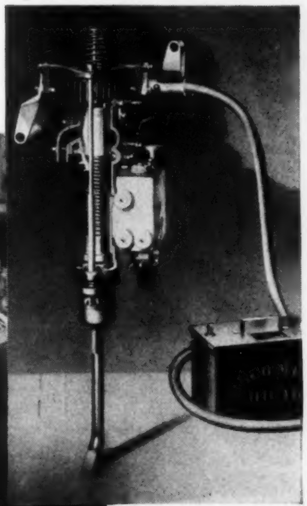
RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

BARCO TYTAMPERS

SHOULD BE ON YOUR 1939 BUDGET...

Equally Efficient For Tamping, Cribbing, Or Ice Breaking





37 *Railroads Are Now Using* **BARCO** *Gasoline Hammers And Unit Tytampers*

• THE outstanding performance of the TT-2 heavy duty BARCO Unit Tytamper during the last four years has resulted in its widespread acceptance as a year-round tool.

The new, lighter-weight type K-1 has proved its worth during a year of testing and is now available and recommended as a general tie tamping tool for either rock ballast or fine ballast.

Powered for the toughest tie tamping and crib-busting operations, Barco Unit Tytampers are equally efficient for chipping ice in terminal switches and around cross-overs . . . for breaking up frozen cinders and coal, or frozen ground. Low initial cost, and low hourly operating expense, combine with wide-range usefulness to make every Barco purchased an exceptionally profitable investment.

BARCO

BARCO MANUFACTURING CO.
1805 W. WINNEMAC AVE. CHICAGO, ILL.
THE HOLDEN CO., LTD., IN CANADA
MONTREAL MONCTON TORONTO WINNIPEG VANCOUVER

Unit TYTAMPERS

YOU CAN CHECK THESE INSTALLATIONS

Representative Installations in the Chicago District:

Intersection: Indiana Harbor Belt Railroad with the Chicago & Western Indiana Railroad
Location: Dolton, Illinois. (Illustrated above and in circle at right)
Traffic: (94) Trains per day
Installed: November 15, 1937
Wear: After (8) months' service, $\frac{1}{64}$" to $\frac{1}{8}$"

Intersection: Chicago & North Western Railway main line with Chicago & North Western Railway freight line
Location: Des Plaines, Illinois
Traffic: (50) Trains per day
Installed: January 3 and 13, 1938 (2 crossings)
Wear: After (9) months' service, $\frac{1}{64}$" to $\frac{1}{8}$"

Representative Installation on the Eastern Seaboard:

Intersection: D. L. & W. Railroad main line with Erie Railroad—N.Y. & G.L. R. R.
Location: Mountain View, New Jersey
Traffic: (67) Trains per day
Installed: March 31, 1938
Wear: After (7) months' service, $\frac{1}{32}$" to $\frac{1}{8}$"

Representative Installation in the St. Louis District:

Intersection: Alton & Southern Railroad with the Nickel Plate Road
Location: Madison County, Illinois
Traffic: (42) Trains per day
Installed: June 14, 1937
Wear: After (16) months' service, $\frac{1}{32}$" to $\frac{5}{32}$".

AMSCO

TRADE MARK REGISTERED

No. 121 of a series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: A Year's Service To You

January 1, 1939

Dear Reader:

As I look over the issues of Railway Engineering and Maintenance that you receive from month to month, I frequently wonder how many of you ever think of the unique service that this publication renders in keeping you abreast of developments in your chosen line of work in these days of such widespread and rapid change. Where else, I inquire, can you learn so readily of the experience of others in the solution of the problems that confront you? Where else can you secure so conveniently information regarding the newer materials and the newer devices that are being developed by manufacturers to meet your needs? From what other source can you gather so many ideas that will stand you in good stead when new problems arise suddenly?

With this issue you will receive an index of the contents of the 12 issues for 1938, arranged for your ready reference. From this index you can develop the fact that in these 12 issues there appeared 80 feature articles, each presenting some new development in maintenance practices that others have found helpful. In these 12 issues there were published 248 answers to 96 questions dealing with practical problems of maintenance. Within the year 43 new and improved devices and materials of manufacturers were brought to your attention through descriptions and illustrations. And we published 50 editorials commenting on specific problems of maintenance as well as on the broader problems of the railway industry in which maintenance men have concern.

And these issues were the product of the thinking of many persons. No less than 229 different persons prepared articles or discussions, drawn from their practical experience, that appeared in these issues in 1938. And the co-operation of these friends was amplified by the work of 5 editors who traveled more than 50,000 miles last year, seeking out the information that appeared in our pages.

Supplementing this bread-and-butter information, which has been termed a continuing college course in railway maintenance practices, we have also published mention of official changes of more than 700 different persons in railway engineering and maintenance service, many of whom you have known and whose changes have, therefore, been of interest to you.

Thus, in these varied ways, spread through 804 pages (including 454 reader pages), we have endeavored to keep you abreast of changing methods and materials in these changing days, in order that you may be better fitted to serve your roads and through this means be prepared for advancement yourselves—and all for $2.00 or less per year.

Yours sincerely,

Elmer T. Howson

Editor

ETH:EW

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Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

JANUARY, 1939

Railway Engineering and Maintenance

1938

A Year of Disappointment

THE year that has just ended was one of marked disappointment for the railway industry as a whole and equally so for the engineering and maintenance of way departments. After picking up markedly during the first half of 1937, traffic and earnings eased off in the late summer and then declined precipitously in the closing months of that year and through the first half of 1938 until they approached the low of 1932. As a result, expenditures were cut to the bone, employment declined to a new low for recent years and improvement work was brought almost to a standstill. Because of this condition, the plight of the railways has become of national concern and business men and legislators alike are seeking energetically to devise means for relief. To this end a committee of three railway executives and three representatives of railway labor, appointed by the President, submitted a report in the closing days of the year that contained far-reaching and constructive recommendations that will provide the basis for legislation which, if enacted, will go far towards correcting the more basic conditions that are today throttling the railways.

The year opened with traffic moving at a distinctly lower level than in the previous year and carloadings showed a decrease, as compared with the corresponding weeks of 1937, in each of the first 45 weeks of 1938. The decline in the first six months was 25.3 per cent, in the third quarter 21.7 per cent, and in the closing three months of the year 2.9 per cent, the relative improvement in the latter quarter being due in part to the abrupt decline that began late in 1937 and in part also to the more than seasonal pick-up in carloadings in the closing weeks of 1938. These declines in traffic were reflected in corresponding, although not quite as large, declines in operating revenues and this, in turn, necessifated drastic curtailment in expenditures for the maintenance and improvement of roadway and structures.

The Year's Record

Taking the year as a whole, the operations may be summarized as follows, the figures being taken in large part from a compilation prepared by J. H. Parmelee, director of the Bureau of Railway Economics:

Freight traffic (ton miles) declined 19.6 per cent under 1937, as compared with an increase of 6.7 per cent the previous year. It was 33.0 per cent below the average for 1926-1930.

Passenger traffic (passenger miles) declined 11.6 per cent under 1937, as contrasted with an increase of 10.8 per cent during that year. It was 45.0 per cent below the 1926-1930 average.

Operating revenues decreased 14.8 per cent under 1937; operating costs (including expenses, taxes, equipment and joint facility rentals) decreased 10.9 per cent.

Net railway operating income totaled $362,000,000 in 1938, a decrease of 38.6 per cent under 1937 and $753,000,000 below the average for 1926-1930. This was a rate of return on property investment of 1.39 per cent, as compared with 2.26 per cent in 1937.

The roads failed to earn their fixed charges in 1938 by $125,000,000; in the previous year they earned $98,000,000 after fixed charges.

Railway tax accruals totaled $345,000,000 in 1938, as compared with $325,655,000 in the previous year. They included $47,000,000 for railroad retirement and $52,500,000 for unemployment compensation.

Two Class I railways went into trusteeship and 1 into receivership during the year. At the end of 1938, a total of 111 companies, including 39 Class I roads, with a total mileage of 78,016, or 31 per cent of the total in the United States, were in the hands of the courts. This is both the greatest mileage and the largest proportion of the total ever in the hands of the courts at one time.

Purchases of materials and equipment from manufacturers totaled $394,130,000 in 1938, as compared with $870,722,000 in 1937. Total purchases, including fuel, aggregated $633,111,000 in 1938, as compared with $1,153,088,000 in 1937.

Operating Indices

Turning to operating indices, the operating ratio for 1938 was 76.3 per cent, as compared with 74.9 per cent in 1937.

The average speed of freight trains between terminals established a new high record of 16.6 miles per hour, as contrasted with 16.1 miles the previous year.

The average movement per "active" freight car per day (excluding surplus and unserviceable units) was 38.9 miles; it was 40.6 miles in 1937.

Freight locomotive fuel consumption averaged 113 lb. per 1,000 gross ton miles, a new low record; it compared

with 117 lb. in 1937 and with 163 lb. in 1922.

The average train load was 756 tons (first 10 months) as compared with 796 tons in 1937.

Gross ton miles per freight train hour broke all records in 1938 with an average of 31,085 (for first 10 months) as compared with 30,349 in 1937 and 25,837 in 1930.

The total number of fatalities in railway accidents of all kinds declined in the first 9 months of 1938 to 3,326, compared with 4,043 for the same period of 1937, a reduction of 17.7 per cent. Non-fatal injuries declined 28.8 per cent.

During the first 9 months there were 754, or 24.4 per cent, fewer grade crossing accidents than in the corresponding period of 1937, with reductions of 22.7 per cent in the number of fatal and 22.9 per cent in the number of non-fatal injuries.

The number of railway employees during 1938 averaged 940,000, the smallest number since 1897. It represented a decline of 175,000 persons, or 15.7 per cent from 1937. Total compensation paid employees was $1,737,000,000, as compared with $1,985,447,000 in 1937.

Engineering

Construction activities were at a low ebb in all phases except in the separation of grades with highways, which work is being financed with federal funds. Total capital expenditures for all purposes for 1938 are estimated at $250,000,000, or less than half those for 1937, and these went largely for equipment. By way of comparison, capital expenditures for the 8 years 1923 to 1930, averaged $842,715,000 per year, while for the years 1931 to 1938, they averaged $261,606,000.

Only 38.16 miles of new lines were built in the United States, the smallest mileage built in any year since 1830, with the single exception of 1933, when 24 miles were built. In contrast, 1,897 miles of lines were abandoned during the year. During the 22 years, beginning with 1917, a total of 22,109 miles of lines have been abandoned while only 10,472 miles of new lines have been constructed. This trend has also been evidenced in the campaigns initiated on many roads to remove buildings and other facilities that have been outmoded or otherwise made oblete, to escape further charges for maintenance and taxes.

Maintenance Expenditures

The drastic decline in traffic and in earnings was reflected in a reduction in expenditures for maintenance of way and structures, thus reversing the trend towards more adequate outlays that had prevailed since the low of 1932. After building these expenditures up from $351,000,000 in 1932 to $496,000,000 in 1937, they declined to $425,000,000 in 1938, a decrease of $71,000,000, or 14 per cent from the preceding year and of 50 per cent from the 1925-1929 average.

This retrenchment prevailed throughout the year, each month showing a decrease as compared with the corresponding month of 1937. It has also extended into all branches of activities, and especially into those avenues which had been reopened in 1937 after several years of more or less complete neglect. This retrenchment has been made in the face of a season that was characterized by severe highly localized and destructive storms throughout the Central West and an unusually destructive storm in New England in September, storms that exacted heavy toll on maintenance allowances on several railroads.

Maintenance Expenditures 1917-1938

1917	$ 442,108,862	1928	837,905,747
1918	649,794,953	1929	855,354,867
1919	772,186,045	1930	705,470,940
1920	1,032,540,381	1931	530,612,890
1921	756,413,690	1932	351,179,041
1922	728,663,534	1933	322,335,022
1923	813,688,760	1934	365,285,353
1924	792,678,023	1935	393,642,261
1925	816,443,205	1936	454,842,407
1926	866,819,365	1937	496,000,000
1927	868,581,432	1938*	425,000,000

*Last two months estimated.

While the amount spent for the upkeep of the fixed properties during 1938 was appreciably larger than in the years 1932-1935, it was not adequate to make good the current wear and tear on the property, especially in the face of the increasingly severe demands that are being made on the tracks and structures by the faster schedules of these days. The year has added, therefore, to the accumulation of deferred maintenance, especially in those details relating to the upkeep of buildings and other facilities not related directly to safety of travel. As a consequence, we see no reason to modify the statement made a year ago that "there is no warrant for the conclusion that expenditures in recent years, taking the railroads as a whole, have been effective in making good more than current wear and tear. As a consequence, the large volume of deficiencies in maintenance that accrued during 1931 to 1935, inclusive, comprises a stern physical fact that still confronts the managements of the railroads. What this amounts to in actual figures is difficult of exact determination, but a careful study points to a sum of the order of a billion dollars."

It is interesting in this connection to note that the Interstate Commerce Commission has taken cognizance of the question of deferred maintenance through the issuance, late in the year, of a questionnaire designed to develop information regarding the magnitude of the accumulation. Because of the necessarily general character of the questionnaire and the latitude given for individual attitude, the results will be watched with interest.

More Fast Schedules

The year was characterized by the extension of high-speed train schedules into numerous new areas. Thirty-one new streamlined trains were placed in service during the year, as compared with 16 such trains inaugurated in 1937 and a total of 54 such trains since their inception in 1934 to 1937, inclusive. Among these trains were 16 for the Santa Fe, 4 for the New York Central, 7 for the Pennsylvania and 2 for the Milwaukee, while still further trains are under construction for delivery early this year. As a result, there are now 8 trains in the world, all in the United States, which cover distances of 900 miles or more at average speeds of 60 miles per hour or greater. Aside from these trains, there has been a tightening up of schedules of other trains in both freight and passenger service throughout the country, with their corresponding intensification of demands for more refined maintenance of tracks.

There is also an increasingly strong demand from the

public for the modernization of station facilities in keeping with the newer services offered in the way of trains. This is leading to the renovation of numerous stations, the beginning of a movement that will extend far. Similarly, the demand is steadily becoming more pressing for the revision of existing facilities to adapt them more fully to operating needs and enable the roads to benefit more largely from developments in services which they have already adopted.

Rail and Tie Renewals

The tonnage of rails laid in renewals has long been regarded as one index of the adequacy of maintenance. While the development of methods for the care of rails, such as welding and the use of curve oilers, as well as the heat treatment of ends and other refinements in the manufacture of the rails, have tended to increase the service life of rails and postpone the necessity for their renewal, these effects have been offset in part by the better track maintenance necessitated by the schedules of today's superspeed trains. As nearly as can be estimated at this time, approximately 400,000 tons of rails were laid in renewal last year, or about 20 per cent of the tonnage relaid annually during the years 1925-1929 and equalling that laid during 1932 and 1933, the depression years of lowest activity.

Rails Laid in Replacements, Class I Railroads

	Gross Tons		Gross Tons
1925	1,950,146	1932	394,536
1926	2,209,873	1933	403,254
1927	2,124,765	1934	631,093
1928	2,080,277	1935	582,794
1929	1,958,489	1936	921,298
1930	1,517,002	1937	1,029,861
1931	984,900	1938 (est.)	400,000

Another common index is the volume of tie renewals. Here the normal requirements are affected less by traffic and by changes in recent practice. Yet we find the same evidences of retrenchment and of deferred maintenance. In the five years 1925-1929, when funds were available for adequate maintenance, the railways renewed 79,000,000 ties per year. In 1938, it is estimated that they renewed slightly less than 40,000,000, or only slightly more than in the low year, 1933.

Crossties Applied in Renewals, Class I Roads

1925	82,716,674	1932	39,190,473
1926	80,745,509	1933	37,295,716
1927	78,340,182	1934	43,306,205
1928	77,370,491	1935	44,351,900
1929	74,679,375	1936	47,361,015
1930	63,353,828	1937	47,729,538
1931	51,501,659	1938 (est.)	40,000,000

In view of these figures, we believe that our estimate made a year ago is increasingly conservative now—namely, that "a most conservative analysis points to large deficiencies—some 3,000,000 tons of rail and around 90,000,000 crossties."

In view of these deficiencies in maintenance expenditures, the question arises whether they have progressed to the point of endangering safety of track. The enviable record that the railways have made in reducing accidents due to defects of roadway over a long period of years comprises an eloquent commentary on the wisdom with which the money available has been spent in building up a reserve of strength for the days of adversity and limited funds. Yet it may not be without significance that after declining from 2,090 per billion locomotive miles in 1924 to 1,175 in 1929 and continuing this downward trend to 581 for the three years, 1932-1934, the number of train accidents ascribed to defects in track has since increased to 760 in 1936 and 845 in 1937.

Work Equipment and Employment

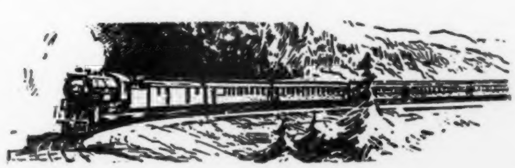
While the curtailment in available funds was reflected in reduced purchases of work equipment in 1938, these purchases were by no means suspended. Rather, more than 1,300 units were purchased last year, as compared with some 3,200 units in the preceding year, the details of which are set forth on a following page. In part these purchases comprise the replacement of older units, although they were inadequate to overcome the full effects of obsolescence. In part also they reflect the purchase of units to meet needs heretofore unsatisfied.

Employment in the maintenance of way department during 1938 reflected the same trend as expenditures. In every month of the year the number of persons employed was less than in the same month of 1937, the average force for the year approximating 187,000, as compared with 231,418 in 1937, a reduction of 19 per cent.

What for 1939?

The year that has just closed has been one of disappointment, of curtailed plans, of added difficulty in spreading inadequate allowances over increasing demands. What of the new year?

Without venturing a long-range forecast in these days of wide uncertainties, it is pertinent to direct attention to certain facts. In the first place, we are now in a period of improving confidence and of more than seasonal increase in traffic, in direct contrast with the trends a year ago. Furthermore, the country is now awake to the needs of the railways and the prospects are more favorable for helpful legislation than for some years. Also, the public is alive to the unfairness of much of the competition to which the railways are subjected and sympathetic to measures to establish greater equality of competition. Again, the railways themselves, through their many new trains and other outstanding improvements in service, are showing an aggressiveness that is itself recapturing business that had been allowed to go to competitors. All in all, the new year appears to be one of real promise for the railways—for those who maintain its fixed properties and for those who provide the materials and equipment used therein.



Railways Continue To Buy Work Equipment

More Than 1,300 Units Added in 1938, Despite Sharply Reduced Purchases of Other Materials

INDICATING that the railways of the United States and Canada are coming more and more to rely on power machines and tools in the performance of maintenance work, they purchased more than 1,376 units of work equipment in 1938. The magnitude of these purchases during a period of sharply reduced maintenance activity is all the more surprising, since they followed three years of relatively heavy purchases of such equipment, and furthermore, they were made during a period when the purchases of other materials and equipment were being kept to the minimum.

Wide Range of Types

As in former years, the list of units purchased included a wide range of types for an equally wide range of maintenance operations, the list comprising 83 separate types. This equipment also included a wide range of sizes, from pile drivers, locomotive cranes and large ballast-cleaning machines, to small portable power tools for bridge and building work. Furthermore, the diversity of these purchases demonstrates the progress that has been made in the mechanization of maintenance-of-way work since it started from scratch only a little more than two decades ago. Most of the progress that has been made in the development of better and more economical practices in maintenance in recent years can be attributed directly to the use of this equipment.

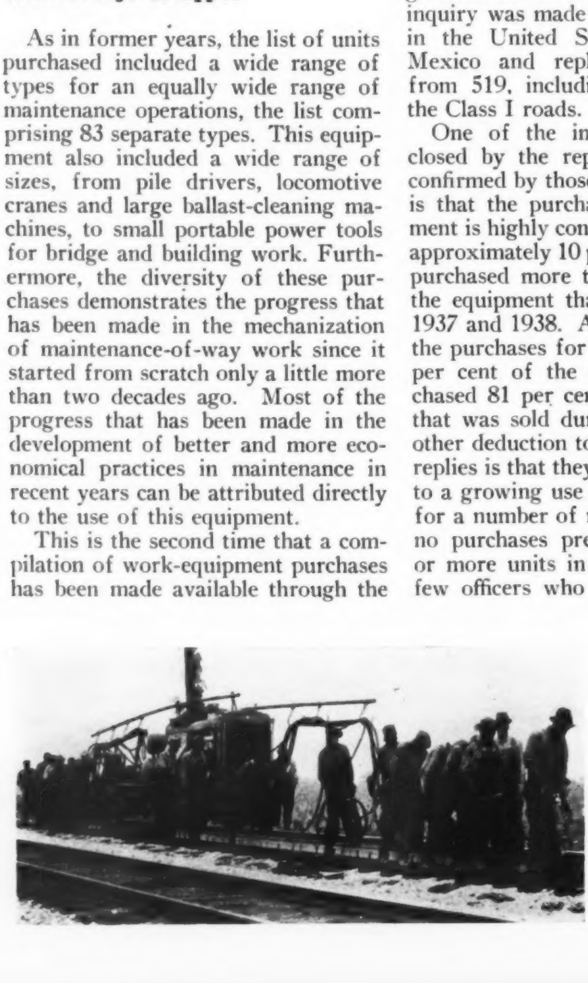
This is the second time that a compilation of work-equipment purchases has been made available through the co-operation of the railways, last year being the first time it was ever attempted. It is, therefore, of special interest, for it constitutes a further measure of the use of equipment of this character and of the attitude of the railways as a whole toward its use. To obtain the information which is given in detail on the following pages, inquiry was made of all of the roads in the United States, Canada and Mexico and replies were received from 519, including all but two of the Class I roads.

One of the important facts disclosed by the replies last year, and confirmed by those received this year, is that the purchase of work equipment is highly concentrated as yet, for approximately 10 per cent of the roads purchased more than 90 per cent of the equipment that was sold in both 1937 and 1938. Again, an analysis of the purchases for 1938 shows that 22 per cent of the Class I roads purchased 81 per cent of the equipment that was sold during this year. Another deduction to be drawn from the replies is that they point unmistakably to a growing use of work equipment, for a number of roads that had made no purchases previously bought one or more units in 1938. Again, not a few officers who advised as recently as three years ago that they had no need for more equipment, purchased a considerable number of units in both 1937 and 1938, in some cases of types they had not used previously, and in others, to add to those already in use.

The Field Expands

In other words, despite the fact that a number of roads have a large amount of work equipment in use, this is no criterion of its ultimate possibilities, for these data show that the use is still expanding, even on those roads that have the largest number of units in service, and will continue to do so for some years as maintenance officers realize more fully the advantages of mechanizing their operations. Furthermore, the recent advance in wages granted to maintenance of way employees is making the use of work equipment more attractive, and is bringing some types of equipment into the picture, which many officers believed could not be justified previously on grounds of economy. In this connection, it is to be noted that several roads that had made no purchases of work equipment previously, except motor cars, bought a few units in 1938.

To any one who has followed the development of the use of power machines and tools in maintenance, it is obvious that no road has all of the work equipment it needs, and that many fall far short of this objective. This is confirmed by direct statements to this effect by many maintenance officers and by the fact, already mentioned, that not a few officers who no longer than three years ago believed that they had enough equipment to meet all of their requirements, are already buying more. Furthermore,



Power Spike Drivers Are Now Used Extensively

Tractors for Widely Diversified Purposes, Were Among the Purchases Made

as this expansion continues, there will also be a large and stabilized demand for the replacement of worn-out and obsolete units and for repair parts.

Although it is obvious that many of the units purchased in 1938 were for the replacement of worn-out and obsolete machines, the trend toward a wider use of work equipment is also shown by the number and types of equipment purchased by individual roads, and by the further fact that many of the purchases included units of types that have only recently become available, as well as of others that, while available, have only lately been applied in maintenance work.

Modernization

The replies also indicated that the trend toward modernization which first became noticeable about three years ago is continuing. The most outstanding of these indications is the number and character of the motor cars purchased, 755 units of this type having been reported as bought in 1938. While a number of heavy duty cars were included, the majority were lighter cars for section and inspection use, indicating the replacement of heavy cars that cannot be handled readily by the reduced section gangs, and an extension of the system of track patrol which has been meeting with increased favor for several years.

Another indication of this trend toward the modernization of work equipment, as well as of a wider use of this equipment, is the fact that 73 tie-tamper outfits (large and small) were purchased in 1938, this being in addition to a number of individual tie-tamping tools which were also purchased to replace worn-out equipment or as substitutes for older designs. There is also evidence of a movement toward the extension of the use of this equipment through purchases of lighter units suitable for use by gangs too small to warrant the assignment of larger and heavier outfits.

That more attention is being given to the appearance of the right of way, roadbed and track, despite drastic reductions in some other maintenance activities, than was being shown for several years subsequent to 1929, is evidenced by the purchase of 33 weed-destroying units, including mowing machines with rail mountings, weed burners, ballast discers and scarifiers. These are in addition to a number of mowers that were purchased as attachments to or for use with tractors. Incidentally, several heavy duty motor cars were purchased specifically for fire patrol purposes.

Although cranes have been in use longer than most types of equipment, few roads have as many units of this type as they require for the effective prosecution of maintenance work. Furthermore, most of those now in service are obsolete in design and many of them are approaching the end of their service life. Information obtained year by year from maintenance officers has shown that there is a large unfilled need for this equipment, including rail, locomotive and crawler-mounted units. With the general adoption of heavier rail it has become impracticable to lay it economically or safely without the use of rail cranes. However, like other cranes, most of those in rail-laying service are old and need to be replaced with units of more modern design. It is a reflection of the greatly reduced rail-renewal programs that only two rail cranes and only five of all other types were reported as purchased by the railways.

Wider Use of Small Power Tools

Although the purchases of air compressors and electric generators, other than those included in tie-tamping outfits, were small, only 6 of each having been purchased, the trend toward a wider use of small power tools is shown by the fact that 11 different types were purchased, generally for the use of bridge and building gangs. In view of the insistent demand for greater economy in maintenance, it is becoming more and more obvious to maintenance officers that they cannot continue to allow hand work in those tasks that can be done better and cheaper through the use of small

Much Crawler Equipment Is Being Used

power tools. As an illustration of the benefits to be derived from the use of tools of this class, the bridge engineer of an important western road said recently that if his road had not been well equipped with power units and small power tools, it is doubtful whether the bridges could have been kept to the desired standard during the last 5 or 6 years. This road has recently added a considerable number of such units to its equipment and is contemplating the purchase of still others in 1939. This is only one indication of the large potential demand for such tools and portable power units.

Changing Practices

Further evidence of the changing practices in maintenance, which have been stimulated by the development of new designs of power tools, is the fact that 20 bolt tighteners were purchased in 1938. Although originally conceived as part of the equipment for gangs engaged in laying rail, new methods of economy have been discovered in their use in the routine tightening of bolts. For this reason, while a few of these units were intended for use in laying rail, most of them were purchased for assignment to specially-organized gangs that are working progressively over districts or entire divisions, to relieve the section forces of the routine task of tightening bolts by hand.

Another type of equipment which is beginning to come into wider use is electric-lighting outfits for emergency work at night. Heretofore, reliance for such lighting has been placed largely in carbide lights and oil-burning torches. With the development of small, easily portable generators of sufficient capacity to provide lighting current, equipment of this type is finding increasing favor, as is indicated by the fact that four such outfits were purchased in 1938.

Crawler Mountings Find Favor

Also indicating an increasing need for earth-moving equipment, especially for ditching, that is free of the restrictions imposed by rail mountings, 17 such units on crawler mountings were purchased in 1938, including power shovels, draglines and tractors. That off-track equipment will find a wider use is certain, for the many recent decisions of the Railway Adjustment boards requiring the employment of train-service men on rail-bound equipment that cannot be removed readily from the track, is greatly reducing the economy of many of these machines to the point where their further use cannot economically be justified.

That the seven tractors purchased were not intended exclusively for earth-moving purposes, however, is shown by the fact that the auxiliary equipment that was purchased with them included, in addition to bulldozers, angle dozers, front-end loaders, etc., rotary sweepers, mowing machines, etc. Tractors, in themselves, are of little use in railway maintenance, but when equipped with auxiliary devices, such as graders, mowers, sweepers, bulldozers, snow loaders, hoists, booms, etc., they become more highly versatile than almost any other type of equipment. In addition to the seven tractors mentioned, several of the welding generators, of which 12 were purchased, were placed on tractor mountings.

Growing Use of Highways

One of the most interesting trends is the growing use of the highways by the railways, for moving and distributing men and materials in motor trucks. Until about two years ago the use of motor trucks in maintenance was confined largely to congested terminals. More recently, to avoid the cost and uncertainty of making delivery of materials, often needed quickly, by work or revenue trains, this practice has been extended to sections removed from terminals, and in 1938 the railways purchased 84 trucks and 6 trailers, one of the former being a combination vehicle for both passengers and freight, mainly for use out on the line. In addition, 10 passenger automobiles were purchased by the railroads during that year.

The detailed list of the work equipment purchased by all of the railways in 1938, except the two that have been mentioned, was as follows:

United States

Alaska
1 Bulldozer
1 Motor car, section
1 Tractor

Alton and Southern
2 Jacks, bridge 100 ton
1 Motor car, extra gang
1 Weed burner

Atchison, Topeka & Santa Fe
1 Motor car, heavy duty
13 Motor cars, inspection
10 Motor cars, section
1 Paint spray car
1 Welding outfit, electric

Atlanta, Birmingham & Coast
11 Motor cars, section

Bangor & Aroostook
2 Drills, electric
1 Motor car, inspection
5 Motor cars, section
1 Paving breaker

Bonhomie & Hattiesburg Southern
1 Saw, power

Boston & Maine
4 Automobile trucks
4 Bolt tighteners
1 Electric lighting outfit
2 Motor cars, section

Canton & Carthage
1 Motor car, section

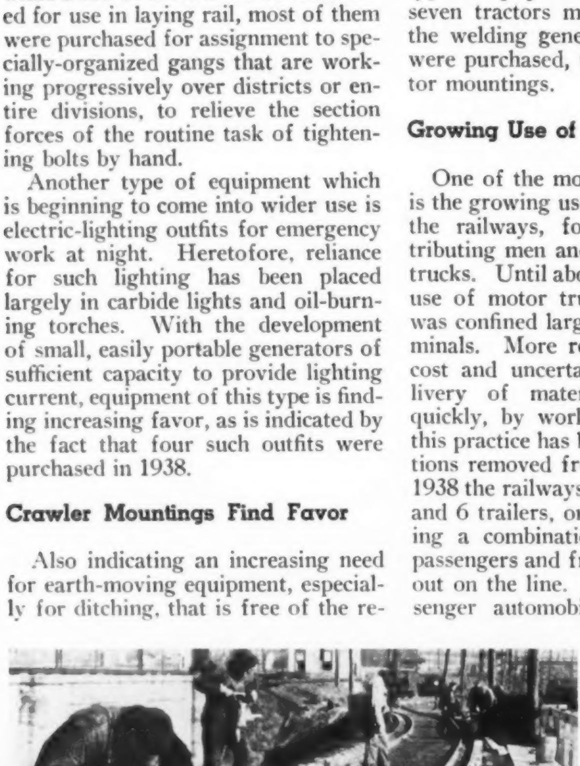
Central of Georgia
2 Motor cars, inspection
2 Rail and flange lubricators

Central of New Jersey
1 Rail and flange lubricator

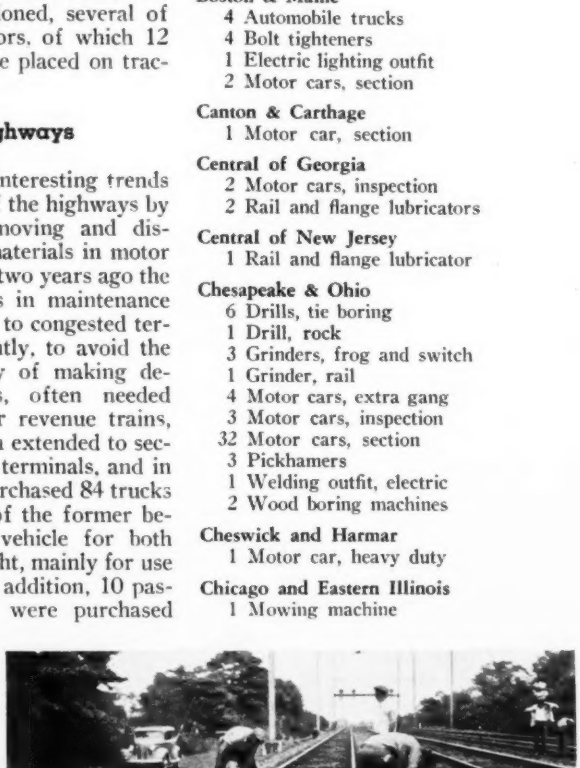
Chesapeake & Ohio
6 Drills, tie boring
1 Drill, rock
3 Grinders, frog and switch
1 Grinder, rail
4 Motor cars, extra gang
3 Motor cars, inspection
32 Motor cars, section
3 Pickhamers
1 Welding outfit, electric
2 Wood boring machines

Cheswick and Harmar
1 Motor car, heavy duty

Chicago and Eastern Illinois
1 Mowing machine



Power Bridge Tools Are Gaining Favor



Many Rail Grinders Were Ordered

5 Motor cars, section

Chicago & Illinois Midland
2 Jacks, bridge
3 Motor cars, section
3 Motor cars, inspection
1 Weed burner, swing type

Chicago & North Western
2 Cable sprayers
1 Drill, bonding
1 Hammer, electric
17 Motor cars, inspection
44 Motor cars, section
1 Pipe pusher
3 Tie tamping outfits

Chicago, Burlington & Quincy
1 Motor car, inspection
9 Motor cars, section
2 Spike pullers
1 Wrench, impact

Chicago Great Western
5 Motor cars, section
1 Rail straightener

Chicago, Indianapolis & Louisville
1 Bolt tightener
5 Motor cars, section

Chicago, Milwaukee, St. Paul & Pacific
1 Bolt tightener
2 Concrete mixers
1 Crane
20 Motor cars, heavy duty
38 Motor cars, inspection
36 Motor cars, section
1 Shovel, crawler
1 Spreader

Chicago, Rock Island & Pacific
2 Bolt tighteners
1 Dragline
15 Motor cars, heavy duty
28 Motor cars, inspection
30 Motor cars, section
6 Mowing machines
1 Pile driver
1 Tie adzer

Chicago, West Pullman & Southern
1 Welding outfit, electric

Clarendon & Pittsford
1 Motor car, section

Colorado & Southern
2 Motor cars, section

Columbia & Cowlitz
2 Rail and flange lubricators

Denver & Rio Grande Western
1 Crane, rail
1 Dragline (combination shovel)
2 Drills, post
1 Extinguisher car
4 Drills, rail
1 Jack, power
71 Motor cars, various
2 Rail slotting machines
2 Spike pullers
5 Tie tamping outfits
90 Track liners
1 Weed burner

Denver & Salt Lake
1 Pumpcrete outfit

Detroit & Mackinac
1 Motor car, section
1 Mowing machine

Duluth, South Shore & Atlantic
2 Motor cars, section

Elgin, Joliet & Eastern
2 Motor cars, inspection
2 Motor cars, section

Erie
7 Automotive trucks
6 Drills, heavy duty
2 Hammers, steam pile driving
6 Motor cars, inspection
7 Motor cars, section
1 Mowing machine
1 Paint spraying outfit
2 Saws, electric
1 Saw, pneumatic

Florida East Coast
9 Motor cars, inspection
1 Welding outfit, electric

Fort Worth and Denver City
3 Motor cars, section

Great Northern
1 Angle dozer
3 Automobiles, passenger
6 Automobiles, trailers
11 Automobile trucks
1 Ballast discer
4 Bolt tighteners
2 Buckets, clamshell
1 Bucket, dragline
1 Bucket, orange peel
2 Bulldozers
1 Crane, crawler mounted
1 Crane, rail
1 Engine, gasoline
1 Hoist, engine driven
8 Motor cars, heavy duty
2 Motor cars, inspection
42 Motor cars, section
3 Motor car bodies
5 Mowing machines
1 Rock grapple
1 Scraper, revolving
1 Spike puller
8 Tie cutting machines
4 Tie tamping outfits

Gulf Coast Lines
1 Bolt tightener
1 Front-end loader, crawler
2 Mowing machines
1 Tie adzer

Illinois Terminal
4 Tie tamping outfits

International Great Northern
1 Bolt tightener
1 Dragline
2 Mowing machines

Lake Superior & Ishpeming
1 Motor car, section
2 Rail and flange lubricators

Lehigh & Hudson River
1 Motor car, section
2 Tie tamping outfits

Lehigh & New England
1 Motor car, inspection
1 Motor car, section
2 Rail and flange lubricators

Lehigh Valley
2 Ballast drainage cars
1 Crane
1 Jackhamer, rods and bits
6 Motor cars, section
12 Rail and flange lubricators

Maine Central
1 Bolt tightener
1 Motor car, inspection
5 Motor cars, section
8 Tie tamping outfits

Minneapolis & St. Louis
1 Discer
2 Motor cars, section

Minneapolis, St. Paul & Sault Ste. Marie
1 Gasoline engine (for rail drill)
2 Motor cars, inspection
12 Motor cars, section
1 Mowing machine
1 Weed burner

Minnesota & International
5 Motor cars, section

Mississippi & Skuna Valley
1 Motor car, heavy duty

Missouri-Kansas-Texas
2 Ballast drainage cars

Missouri Pacific
1 Bolt tightener
1 Dragline, crawler mounted
3 Motor cars, extra gang
24 Motor cars, inspection
20 Motor cars, section
1 Portable light plant, electric

Mechanical Adzers Were Used Widely

Lubricators Now Have Wide Acceptance

More Bolt Tighteners Were Purchased

20 Tie tamping outfits
1 Tractor, crawler mounted
1 Trail builder
1 Weed burner

Mobile & Ohio
1 Boring and wrenching flexible shaft outfit
1 Paving breaker

Montpelier & Wells River
1 Motor car, inspection
1 Motor car, section

New Orleans Public Belt
1 Welding outfit

New York Central System
1 Bolt tightener
1 Automobile, passenger
1 Automobile truck
1 Boring machine, power
1 Crane, locomotive
6 Motor cars, inspection
6 Motor cars, section
4 Paving breakers
1 Weed destroying car (includes scarifier and ballast shaping blades)

New York, Chicago and St. Louis
1 Automobile truck
2 Bolt tighteners
6 Motor cars, inspection and section
14 Rail and flange lubricators
1 Tie tamping outfit, crawler mounted

New York, New Haven & Hartford
6 Automobiles, passenger
9 Automobile trucks
2 Boring bars
1 Connecting rod aligner
1 Connecting rod straightening press
1 Diesel engine
2 Gasoline engines
1 Generator, gas engined
1 Hammer, steam pile
1 Inspection table
10 Motor cars, inspection
2 Tie tamping tools
1 Trail builder
1 Valve refacer
1 Valve reseater
2 Wrenches, hammer

Norfolk & Western
4 Air compressors
1 Concrete mixer
1 Crane, gasoline engine
1 Drill, air
2 Grinders, rail
1 Lining transit
6 Motor cars, section
4 Welding outfits
12 Wood boring machines

North Louisiana & Gulf
2 Motor cars, section

Northwestern Pacific
2 Diggers, clay
2 Hoists
1 Jackhamer
1 Motor car, section

Panama
1 Rail and flange lubricator

Pennsylvania
46 Automobile trucks
1 Ballast cleaning machine
7 Grinders, rail
8 Grinder trailers

Pere Marquette
20 Tie tamping outfits

Richmond, Fredericksburg & Potomac
6 Motor cars, section

St. Louis-San Francisco
1 Air compressor, including chain saw, wood boring tools and wrenches
1 Air compressor, engine driven self-propelled
4 Motor cars, extra gang
7 Motor cars, inspection
3 Mowing machines
2 Spike pullers

St. Louis Southwestern
2 Motor cars, inspection
2 Mowing machines

Seaboard Air Line
1 Dragline
2 Tie tamping outfits
5 Rail and flange lubricators

Southern
1 Drill, power
5 Generators, portable
1 Hammer, portable gasoline
5 Sets of saws, drills and other power tools for use with generators

Southern Pacific
3 Bulldozers
4 Diggers, clay
5 Jackhamers
2 Lighting plants, electric
10 Motor cars, section
3 Tractors, crawler mounted
1 Welding outfit, electric
2 Wrenches, rotary

Southern Pacific (in Texas and Louisiana)
1 Bucket, shovel
1 Cutting machine, gas portable
1 Jackhamer, pneumatic
1 Shovel boom, with bucket

Spokane, Portland & Seattle
1 Automobile truck
1 Motor car, heavy duty
10 Motor cars, section
1 Paving breaker
1 Tie cutting machine

Texas & Pacific
1 Bulldozer
1 Dragline
1 Grinder, rail
1 Tractor, crawler mounted
1 Welding outfit, electric

Union Pacific
1 Engine, gasoline
1 Fire truck, with rotary pump
2 Grapples, rock
1 Motor car, inspection
1 Snow plow
1 Sump pump, electrical vertical centrifugal
1 Sump pump, electrical

Utah
1 Auto truck, passenger and freight

Virginian
1 Mowing machine
8 Rail and flange lubricators
1 Tractor

Wabash
2 Grinders, rail
18 Motor cars, various
2 Motor car trailers
2 Rail joint slotters
1 Rail puller and expander

Washington, Idaho & Montana
1 Motor car, section

Western Maryland
3 Motor trucks
4 Rail and flange lubricators
4 Tie tamping outfits

White Pass & Yukon
1 Crawler gas shovel

Wichita Valley
5 Motor cars, section

Canada

Canadian National
1 Automobile inspection car
1 Crane (combination shovel)
60 Motor cars, various

Canadian Pacific
1 Grinder, rail
1 Motor car (for fire patrol)

Dominion Atlantic
1 Ballast discer

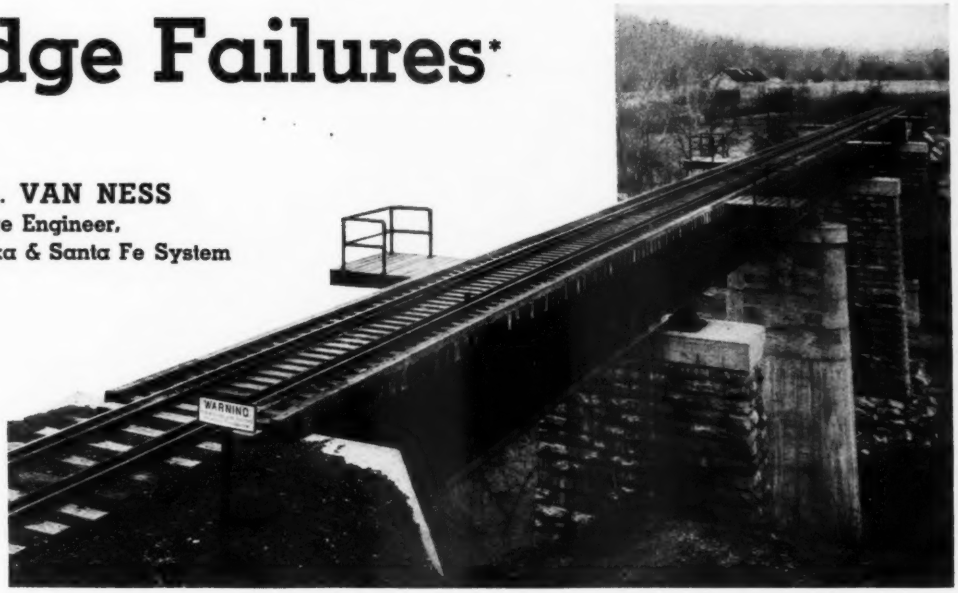
Northern Alberta
1 Dragline, crawler mounted

Quebec Central
1 Motor car, inspection
1 Motor car, section

Suitable Cranes for Rail Laying Effect Economy

Lessons to Be Learned from Recent Bridge Failures*

By R. A. VAN NESS
Bridge Engineer,
Atchison, Topeka & Santa Fe System



The Ravine Section of Bridges Should Be Checked Periodically with the As-Built Section to Disclose Scour

In spite of the enviable record of the railways for few bridge accidents, with only 12 such accidents from January, 1934, to August, 1938, the author makes it clear that only through constant vigilance can this record be maintained, especially in view of present-day operating conditions. On this premise, he discusses categorically the more important details of structures which demand frequent inspection and attention to insure their integrity and that of the structures as a whole

A CHECK of Class I carriers shows that these roads have approximately 192,000 bridges, with a combined length of about 3,900 single-track miles, and furthermore, that on the 380,000 single-track miles of these roads, there are approximately 585,000 culverts. When this large number of bridge structures is considered, one may well be surprised at the few accidents which have occurred, which are chargeable to bridge failures.

I have tabulated the number of such accidents for the years 1929 to 1936, inclusive, and the reportable accidents which occurred are classified as shown in the accompanying table.

In these eight years there were 29 accidents, only 4 of which resulted in injury or death. For the eight years from 1921 to 1928, inclusive, there were 73 reportable accidents. Even considering all of the factors involved, the number of reportable accidents occurring on the railways of the United States from 1929 to 1936, inclusive, is remarkably low.

Bridge Accidents, 1929 to 1936, Inclusive
Classified by Causes

	'29	'30	'31	'32	'33	'34	'35	'36	Total
Bridges—Structural defect or failure	2			2	1		1	1	7
Bridges—Improper or insufficient maintenance	1	2				1			4
Trestles—Structural defect or failure	2	1	2		2	2	1		10
Trestles—Improper or insufficient maintenance	1	1		1		1	2		6
Culverts—Structural defect or failure			1	1					2
Culverts—Improper or insufficient maintenance									
Totals	6	4	3	4	3	4	4	1	29

Causes of Recent Accidents

From January, 1934, to August, 1938, there were 12 accidents in which bridges were involved either directly or indirectly. The causes of these accidents, which can be considered recent bridge failures, were as follows:

(a) Undermining of the substructure. It is important to check periodically the ravine section of a bridge with the as-built section to ascertain whether the stream bed may be lowering enough to cause concern for the foundations. The recent development of steel bearing piles offers an economical type of construction for points where heavy scour may otherwise require deep excavation for spread-footing substructures, and only slightly less economical when compared with timber foundation piling.

(b) Timber trestle weakened by fire. Fire protection for the horizontal surfaces of timber, at least caps and stringers, is advisable, and the cutting of weeds and the removal of any brush collecting around piles is essential. Fire wall construction may be warranted.

(c) Collapse of span as a result of decayed timber piles in pier. Exposed timber piles should be checked periodically by use of a sounding rod for decay below the ground line, and by the use of a hammer to ascertain any unsound condition above the ground line. A close watch must be kept for termites.

*Presented at the recent convention of the American Railway Bridge and Building Association, at Chicago.

The Floor S,stems of the Older Pin-Connected Trusses Should Be Inspected Carefully for Indications of Weakness

(d) Washouts at the ends of timber trestles. This class of accidents is charged to a washout and not against the bridge. Nevertheless, we all appreciate that timber bulkheads are generally vulnerable to high water, that bulkhead plank should be carried well below the ground line, and that the use of rip-rap should not be stinted.

(e) Collapse of pile trestle converted to frame trestle. Converting a pile trestle to a frame trestle by sawing off and capping the piles is good construction provided the piles have adequate penetration and that sufficient longitudinal bracing is installed. Under certain conditions the use of special appliances between the bracing timbers and the piles or posts is necessary to insure that stability of a structure that is not always to be secured by bolts alone.

(f) Spans on curves not anchored. Superstructures on curves are readily retained in position by anchoring the spans to the substructure. If grillages of any type carry the superstructure load to the main support, the grillages should be well tied together and anchored definitely to the substructure.

(g) Collapse of timber trestle as a result of the excess removal of bracing during maintenance work. Particularly in the case of higher structures, it is necessary to have a program, worked out in advance, providing the field forces with a schedule of operations to be followed. For high trestles on curves, this is vital.

(h) Insufficient penetration of piles to resist collapse under scour action. Determining when a pile structure is liable to failure under scouring action is one of the most difficult problems the bridgeman has to contend with. A full stream over a scouring stream bed calls for a cessation of traffic if there is any doubt as to the adequacy of penetration of the piling.

Old Bridges Overstressed

There are few of you who have not experienced the speeding up of old power and the operation of new and heavier power at high speeds. Your 30 and 40-year-old steel spans are now carrying loads much heavier than they were designed to carry. In meeting this situation, we know that the stresses in the steel are well above the original design stress, but we know also that if the details of the structure are kept in proper condition we can raise the unit stress in the main members so long as they do not exceed those limits generally accepted as adequate. It is mainly about the possible failure of the details of steel spans that I desire to call attention.

It is the general procedure to inspect steel bridges several times a year. At least one of these inspections should be made in great detail by those familiar with detailed bridge plans. These men should be able to get over all parts of a structure, and be capable of making a proper record of the inspection. Thus, while the inspection of wood, masonry and composite structures, and of culverts and pipes can be considered as more or less routine, this should not be the case with steel structures.

Important Details

In the following, the details of steel bridges will be discussed, having in mind primarily those of spans on main lines, because we know that a detail considered weak on a main line span may not always be considered weak on a branch line bridge.

(a) Bearings. The ends of spans at each support should be level, so no twist is put in the span. Plates digging into the masonry can be raised on iron filings, which, in addition to taking the twist out of the span, fills the depression in the masonry, excluding moisture which would otherwise collect, with consequent damage to the masonry. The old style flat-plate type of bearing does not distribute the load equally over the masonry, and because of the deflection which occurs in light spans, a line bearing can result, which often causes damage. A centralized bearing is very desirable. The lozenger-type expansion bearing is not effective and can be particularly damaging to masonry.

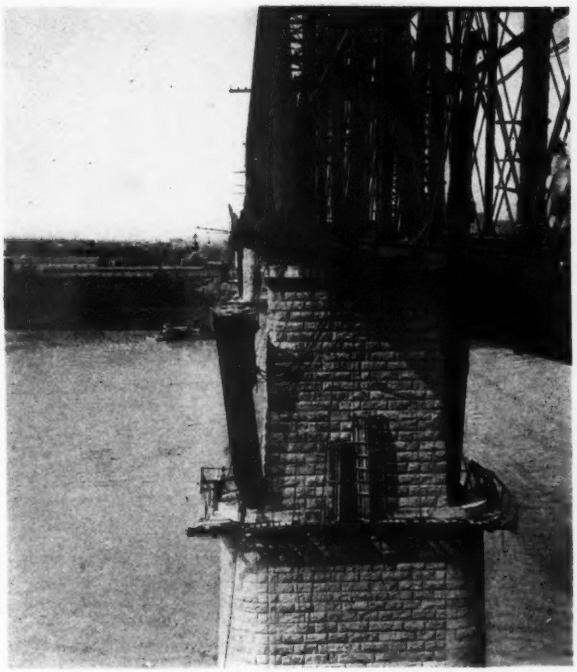
(b) Lateral systems. The top lateral angles of many old truss spans are quite long and very light. Adding section to these angles will stiffen the system considerably and insure a more rigid holding of the top chord members. Many old through truss spans with eye-bar lower chords in the center panels are limber under high speed, with consequent side thrust. Such spans can be stiffened very much by adding stiff members in each panel parallel with the chord. This completes the triangle of bracing and takes the working action off the floor beam at its connection to the post. In certain designs, this working of the floor beam tears the floor-beam web plate, starting from the bottom.

Care Must Be Taken Not To Weaken Timber Trestles in the Process of Their Maintenance or Repair

I have seen such cracks extending 14 in. up in the web. Where such a situation occurs, plates or angles must be added to help resist the twist on the floor-beam web.

The top lateral systems of deck girder spans of old design are attached to the top flanges of the girders. With open decks, and more so with ballasted decks, the angles and plates are subject to the collection of dirt and moisture, with consequent rusting. By setting the top lateral connection plates down to the bottom of the top flange angles, the entire system can be kept cleaned and painted and readily inspected. The lateral systems of all classes of steel spans on curves, particularly those of the older designs, warrant close attention in these days of high speed.

Old spans with stringer and floor-beam-type decks, located on heavy grades, need traction trusses to transmit the longitudinal forces to the main members, rather than having them taken through the top flanges of the floor beams, with consequent distortion at the floor-beam connections.



Old Stone Masonry Should Be Checked Periodically to Insure Its Load Carrying Capacity

(c) At the top-pin end of hip verticals in old truss spans there may be a lack of section in the pin plates. If a theoretical analysis of such points indicates weakness, they should be kept under close inspection until strengthening work can be done.

(d) Deferred maintenance painting of steel spans becomes very costly if carried to the point where rust forms between surfaces, especially where the power of confined rust action is evident. This feature shows up particularly where stitch rivets are lacking, such as in top chord splice plates on old truss spans.

(e) Proper ventilation to minimize deterioration of the steel is of particular value in the case of decks having transverse beam floors. Keeping curbs pulled in away from girder webs will allow the steel to dry, with the result that the breaking down of the paint is much less likely to take place.

(f) Blast plates to protect steel from locomotive stack exhausts below are a source of danger unless the connections are checked periodically for effectiveness.

(g) The increase of axle loads of new power, and of old power due to the added dynamic augment resulting from higher speeds, stresses the connection angles of stringers and floor beams of old bridges to the point where cracks in the fillets or at rivet lines may develop. There are still many connection angles in service which were rolled from Bessemer steel and wrought iron. Where these exist, they must be watched closer for failure than where open hearth steel was used.

(h) Now that many old truss spans are being worked to the limit of their capacity, it is vital that the eye-bars of web members in pin-connected spans be in approximately equal tension. This situation can be obtained by a turnbuckle arrangement or by shrinking the loose bars. Vibrations tend to wear the pin holes and the bars may again become loose. Light diaphragms welded between the bars stiffen them against wind and traffic vibrations.

(i) The strengthening of old bridges by welding is coming more and more into prominence and offers an economical and effective means of securing the results desired. However, a word of caution in this connection is necessary, namely, that no welds be made across the line of stress of main members.

(j) There was a time when the heads of eye-bars were joined to the bars by blacksmith welding. While most of the old truss spans having bars so made have probably been removed from important lines, it seems in order to call attention to the possible failure of such bars resulting from the heads pulling off. The age of spans will help call attention to the need for caution.

So far as I was able to ascertain from records, no accident has occurred from a failure of any of the weak details of steel bridges that have been discussed thus far, but we can never go wrong by talking about such matters whenever opportunity presents itself. By the careful preparation of the inspection form each year by the party making the annual detailed inspection, an enlightening history of each steel superstructure is made available. This applies particularly to the bridges on those portions of a road where the need for keeping such a record is apparent.

A Creditable Situation

We hear much said about the state of maintenance which has obtained on railroad properties during the last eight years because of the lack of funds to do the job in the way we would like to do it. We all are squeezing more value from our old bridges than we would have thought possible ten years ago, and those old and young in experience see eye to eye in this respect. This desirable situation is due in no small degree to the interchange of ideas which takes place at the yearly meetings of your association. You bear the brunt of the battle in resisting the forces of nature and of the rolling wheels over your bridges, and in so doing you are called upon to exercise keen judgment in forestalling dangerous situations. That you have not been "asleep at the post" is clearly evident from the official record of accidents previously referred to. I am proud to join with others of the railroad fraternity in paying tribute to your skill and loyalty, which have made such a record possible.

General View of the Welding Operations Showing (Right to Left) the Welding Machine, the Oxy-Acetylene Cutting Machine, and the Annealing Unit, to the Left of Which Are the Flat Cars for Storing the Welded Rails

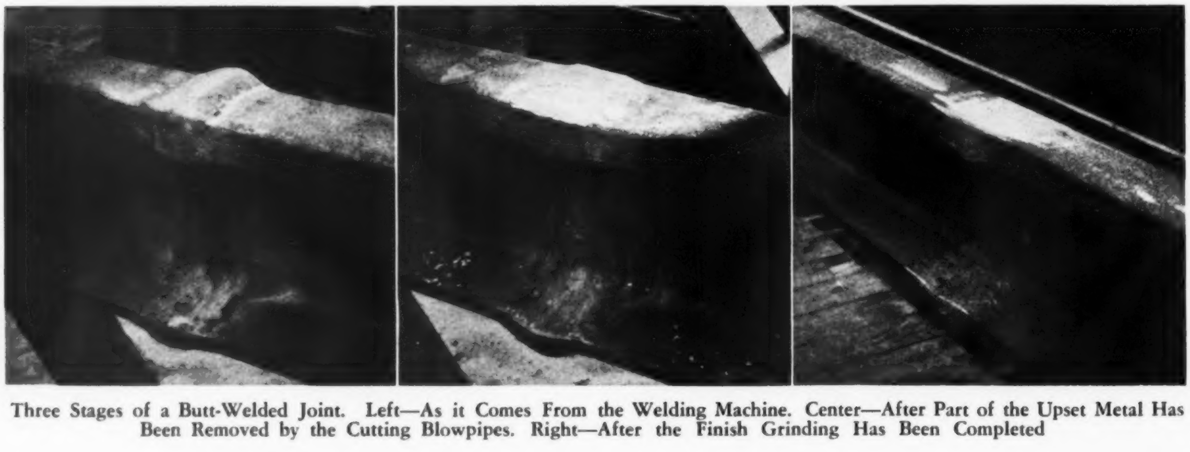
New Oxy-Acetylene Process for Butt-Welding Rails

UTILIZING a newly-developed oxy-acetylene method of butt-welding rails into continuous lengths, the New York, New Haven & Hartford recently installed eight lines of such rails, averaging 800 ft. in length, in the four main tracks through its passenger station area at Hartford, Conn. At this point, where the tracks are carried through the station area on a structural-steel viaduct, moving trains formerly occasioned considerable noise in the vicinity of the station, particularly in a passenger subway under the tracks, and it was largely for the purpose of reducing this noise that the continuous rails were installed. For this installation 112-lb. A.R.E.A. section rails were used, which were butt-welded into four lines having twenty-one 39-ft. rails each, and four lines having twenty-three 34-ft. rails each.

Essentials of Process

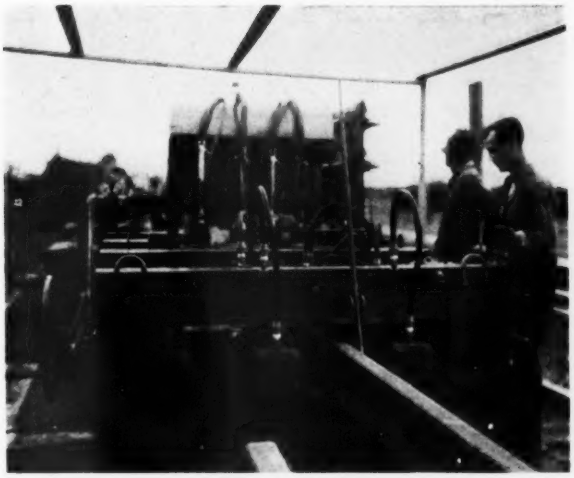
The welding procedure employed was developed and perfected by The Oxweld Railroad Service Company, a unit of Union Carbide and Carbon Corporation, and is known as the Oxweld Automatic Pressure Rail-Welding Process. Using specially-designed equipment, this process involves essentially the uniform heating of abutting rail ends to a temperature of about 2,280 deg. F., utilizing a mechanically-oscillated welding head that applies heat evenly to the rail sections from all directions. Simultaneously with the application of heat, the rail ends are forced together under a pressure which attains a maximum of 2,500 lb. per sq. in. Under these conditions, the rails are brought together in an upsetting action that involves shortening each rail 3/8 in. or each weld 3/4 in.

Another important phase of the procedure is the "normalizing" or stress-relieving operation to which the welds are subjected. In this process, the purpose of which is to achieve a refinement of the grain of the metal



Three Stages of a Butt-Welded Joint. Left—As it Comes From the Welding Machine. Center—After Part of the Upset Metal Has Been Removed by the Cutting Blowpipes. Right—After the Finish Grinding Has Been Completed

When the New Haven butt-welded rails into 800-ft. lengths for installation in four main tracks through its station area at Hartford, Conn., it utilized a new oxy-acetylene method in which, using special equipment, the abutting rail ends are brought together and heat and pressure are applied simultaneously until the weld is completed. Essential features of the new welding procedure and of the incidental operations involved and the equipment employed are described in this article



in the vicinity of the joint and to relieve internal stresses set up during the welding procedure, the joint is uniformly reheated to the critical temperature (about 1,380 deg. F.) and allowed to cool in the atmosphere. In this operation, the reheating of the joint is done with welding heads that are similar in design and arrangement to those used in the welding process.

Physical Properties of Welds

To determine the physical properties of butt-welds made by this method, extensive laboratory tests have been conducted with specimens taken from welds made in 112-lb. rail. Representative results of these tests show that the metal at the butt-weld has a yield strength of 70,000 lb. per sq. in. and a tensile strength of 135,000 lb. per sq. in. with an elongation of 9 per cent. Tensile impact tests with specimens 0.236 in. in diameter show an elongation of 9.5 per cent under a load of 107 ft.-lb. In one series of tests it was reported that of a total of 20 specimens tested, 19 broke at points other than at the weld. In a rolling-load fatigue test involving a welded rail supported as a cantilever, a load of 50,000 lb. was rolled back and forth across the joint through 2,000,000 cycles, and when failure did not occur at the end of this period the test was discontinued.

In addition to the welding and normalizing operations, other steps in the butt-welding procedure include the grinding of the ends of the rail to a high degree of accuracy and cleanliness prior to the welding operation; removal of part of the upset metal by using a machine-guided oxy-acetylene cutting blowpipe; and the finishing of the joints by grinding. These and the welding and normalizing operations are performed in the following order: (1) Facing the rail ends; (2)

Above, Right—The Welding Machine as Seen From the Receiving End. Right—Removing Upset Metal From a Newly-Welded Joint with the Oxy-Acetylene Cutting Machine

In the Normalizing Operation the Welds Are Reheated to the Critical Temperature (About 1,380 deg. F.) and Are Then Allowed to Cool in the Atmosphere

making the butt weld; (3) removing the upset metal; (4) normalizing the weld; and (5) grinding the joint.

In the butt-welding work on the New Haven, all operations were performed on a string of flat cars of sufficient length to accommodate the equipment and the finished lines of rails, these cars being spotted on a conveniently situated yard track at Hartford. The layout involved the use of an adjacent track, from which the rails were transferred from cars to a rack car at the receiving end of the welding line. After the faces of the rails were ground, the rails were barred from the rack onto a conveyor line, consisting of rollers spaced at convenient intervals, by means of which they were conducted through the various operations of welding, cutting and heat treating.

Arrangement of Equipment

Equipment employed in the welding process included the welding machine, situated near the receiving end of the first car beyond the rack car; the oxy-acetylene cutting apparatus for removing the upset metal, which was placed a rail length away near the leaving end of the same car; and the normalizing unit which was located a rail length from the cutting operation near the center of the third or following car. All grinding work, including the facing of the rail ends, was done with portable, power-operated grinding equipment at suitable locations on the cars.

Each Length of Rail Was Laid by Pulling the String of Cars From Beneath It

Welding Machine

The essential features of the welding machine, which is mounted in a heavy frame of structural members, are the welding or heating heads, which are placed near the longitudinal center of the frame; the necessary parts for gripping the trailing end of the leaving rail and the forward end of the incoming rail; hydraulic equipment for applying the desired longitudinal pressure at the juncture of the two rails; and the necessary control devices. A heavy roller at each end of the frame facilitates the movement of the rails through the machine.

Equipment for holding the rails and applying the pressure includes two sets of grippers. The grippers at the forward end of the machine are stationary as to longitudinal movement and perform the function of holding the trailing end of the leaving rail in a fixed position during the welding procedure. The rear set of grippers, on the other hand, is free to move forward, or toward the stationary grippers, as the pressure and heat bring about the fusing and upsetting of the metal at the rail ends. Pressure is applied through the rear grippers by two hydraulic cylinders, one on each side of the rail.

Design of Welding Head

Mounted between the two sets of gripper blocks is the welding head. Essentially the head is comprised of four tip blocks, placed above, below and on each side of the outline of the rail section, each of which contains a series of oxy-acetylene tips. Thus, the abutting rail sections are practically encircled by tips in a plane perpendicular to the longitudinal center lines of the rails. In the tip blocks above and below the rail the arrangement of the tips corresponds in length to the width of the head and base of the rail, respectively, while the face of the block on each side is shaped to correspond roughly to the outline of the side of the rail section and contains tips that are directed toward the side of the head, the web and the upper surface of the base flange.

To permit the heating flames to be oscillated over the desired length of rail, the welding head is suspended from a track-mounted carriage that is operated back and forth longitudinally by means of a shaft from an oil cylinder. Both the length and rate of the oscillating motion are adjustable, and, on the New Haven job, the machine was normally adjusted to give a 3-in. movement of the welding head at a rate of 40 cycles per minute.

Upset Metal on the Sides of the Head and the Edges of the Base Flange at Each Welded Joint Was Removed by a Hand-Held Vertical Wheel Grinder

Control of the flow of oxygen and acetylene is effected by means of separate valves, including a quick-acting shut-off valve for each tip block, which are mounted on a control panel together with the necessary gages. Auxiliary equipment at the welding machine includes a 5-hp. 2-cyl. gasoline engine direct-connected to a two-stage vane-type pump which supplies oil to the hydraulic cylinders. This engine also operates a small pump for circulating cooling water through the tip blocks.

Removing Upset Metal

When a weld has been completed, the line of rails is pulled forward a rail length by means of a hand winch located near the forward end so that the joints are in a position to permit the newly-made weld to be trimmed by the cutting blowpipe and the next previously-made weld to be normalized simultaneously with the welding of a new joint. In the trimming operation, use is made of a portable cutting machine, specially equipped to adapt it to the requirements of this operation. In brief, the unit consists of a motor-operated carriage on which are mounted two cutting blowpipes with bevel-cutting attachments.

One of the cutting blowpipes on the carriage is adjusted to a horizontal position and is used to cut off the upset metal on the running surface of the rail in a horizontal plane.

The Joints Were Surface-Ground With a Roller-Carriage Mounted Cup Wheel Grinder Which Was Tilted from Side to Side During the Grinding Operation

The other blowpipe is used to remove the upset metal from the sides of the head and the edges of the base flange in a vertical plane, and from the upper corners of the head on a bevel. The upset metal underneath the base of the rail is not removed; when laying the rail provision for accommodating this metal when the joint comes on a tie is made by cutting a hole of the proper size in the tie plate with an oxyacetylene blowpipe.

Normalizing Machine

In the normalizing unit, which is mounted in a light structural steel frame, the tip blocks, as stated previously, are similar in shape, design and arrangement to those in the welding machine. They are, moreover, suspended from a carriage having a movement parallel to the rail, which may be oscillated in the same manner as the welding head. In the case of the normalizing unit, however, the carriage is moved back and forth by means of a lever in the hands of the operator. A control panel similar to that in the welding unit also forms a part of the normalizing unit.

In the finish grinding of the joints the running surface and the sides of the head, and also the edges of the base, were ground to a smooth even surface. For the surface-grinding work a cup-wheel grinder in a roller-carriage mounting was used, the carriage being tilted from side to side during the operation in order to form the surface to the proper contour. For grinding the sides of the head and the edges of the base flange at each joint, a hand-held vertical-wheel grinder was used. In both cases the grinders were operated by means of flexible shafts from portable power plants of the "utility" type.

For facing the rail ends preliminary to the welding operations, a cup-wheel grinder on a special mounting was used. This device is fastened rigidly to the end of the rail by clamps and embodies a swinging arm that carries the cup wheel at its lower end. This wheel is mounted with the grinding face in a vertical plane at right angles to the rail and is provided with the necessary adjustments to secure a high degree of accuracy in facing the rail ends. The grinding wheel is operated through a flexible shaft from a portable power unit, also of the utility type, and is oscillated back and forth across the face of the rail end manually by the operator. Aside from the facing operation, other preliminary work done on the rail ends included the insertion of metal discs in the end bolt holes to prevent their distortion during the welding process.

As the butt-welding of each of the eight lines of rails progressed in the manner described above, it was moved along on the conveyor line which extended along the center of the string of cars for its entire length. For the storage of the welded rails pending their insertion in track, racks were provided on the cars on each side of the conveyor line and, as the welding of each line of rails was completed, it was barred onto one of these racks to make way on the rollers for the next line.

Gang Organization

For conducting all work incidental to the welding operation, an organization comprising 12 men was employed, including 2 grinder operators engaged in facing the rails; 2 operators at the welding machine; 1 man for operating the cutting equipment; 1 normalizer operator; 2 grinder operators engaged in the finish grinding and 4 laborers. With this organization, the average output was about 20 joints per day.

In unloading the rails at the point of insertion, the usual method was employed of anchoring the rail in the desired position longitudinally and pulling the cars out from under it. In laying each line of rails it was first barred back onto the rollers in the conveyor line and one end was fastened to the anchorage, which consisted in this case of several work-train cars with brakes applied. A heavy chain was used to fasten the rail, one end of which was connected to a clevis at the end of the rail while the other was looped around the coupler of the end anchor car. The cars were then pulled slowly out from under the rail and the free end of the latter was allowed to drop directly onto the track. In this manner the rails were unloaded without complications, in spite of the fact that the procedure required the laying of one end of each rail around a curve having a maximum curvature of 6½ deg. The rails can, of course, be pulled off the cars if desired.

The rails were laid on single-shoulder five-hole tie plates and were fastened with compression clips at alternate ties, track spikes being used for lagging the tie plates to the ties. This type of construction was considered by engineers of the New Haven to be sufficient to restrain the rail from movement and for this reason no provision was made for expansion or contraction. For a distance of 100 ft. directly over the passenger subway further provision for reducing noise and vibration was made by placing a rectangular piece of ⅜-in. Fabreeka, a composition material with resilient qualities, under each tie plate to act as a cushion.

Observations made subsequent to the installation indicate that this measure has been successful in accomplishing the desired reduction of noise through the station area.

One of the Station Tracks at Hartford After the Continuous Rails Had Been Laid

Maintaining Joints on Yielding Roadbed*

By I. H. Schram

Engineer Maintenance of Way, Erie, New York

IN those cases where the roadbed does not give good support because of poor drainage, soil of low supporting power, or other conditions which are generally defined as soft roadbed, the track should be kept in as good shape as possible, with no detail of maintenance neglected. If this is not done, every lowering of the standard of maintenance aggravates the roughness of the track, which has its primary cause in the weak subgrade.

Bolts constitute an important feature of track maintenance, this importance lying largely in the necessity that they be kept in proper tension on any track that must be kept in smooth surface for good riding conditions. This tension should be just below that which would cause frozen joints, for frozen joints, by interference with the adjustment of the rail to the wave motion caused by traffic, create a more serious condition than bolts that are not tight enough.

If the bolts in track on soft roadbed are not kept tight, the joints become loose and the track tends to churn. This not only does the usual damage to the rail, ties and ballast, but it increases the normal wave motion of the track, resulting in increased rail creepage, distortion of the gage and damage to the ties. This creepage has been known to be severe enough to require the use of switch points in the track to prevent buckling.

This makes it evident that another requisite of track maintenance on soft roadbed is proper anchorage of the rail. Without such anchorage, it becomes impracticable to keep bolts tight or to keep the track safe for operation. Some years ago we had an excellent demonstration of these requirements on a branch line over which a heavy traffic in coal, cement and merchandise was handled. This line extended across a stretch of deep muck land which could not be drained to a depth below subgrade that would insure a stable roadbed, without destroying its value for agricultural purposes. For this reason, the government authorities would not permit drainage that would have been effective in stabilizing the roadbed.

On the other hand, it was necessary to maintain the railway. To do this more effectively, the ties were increased to 8 in. by 12 in. by 12 ft., the rail was anchored solidly in both directions by means of improved anti-creepers, the joints were given special attention for fit, and the track was put in good surface. As a result, this track is now being maintained at minimum expense, with the usual maintenance work on bolts, spikes, anti-creepers and surfacing, and is in shape to carry the heavy freight traffic that passes over it. The use of switch points in the track has been discontinued, and now no trouble is experienced with broken joints, loose bolts, or spread track.

*This discussion was submitted for publication in What's the Answer department of the August issue, in answer to a question whether joints should be kept as tight on soft roadbed as on track that is well supported. Because of its comprehensive character, it was withheld for presentation here as an independent article. For further discussion of the subject, see page 495 of the August, 1938, issue.

Safety—Does It Pay?

SAFETY work has been a recognized activity on practically every railway for more than a quarter of a century, being carried out in many cases through specialized departments. Yet despite all of the efforts that are being made by managements to prevent accidents, men become careless or take a chance, with the result that some one is injured or property is destroyed. The following is abstracted from a bulletin issued to its employes by a road that has been particularly active in safety work, in which it speaks frankly of the accident situation on its own line.

We are alarmed at the number of motor car accidents that occurred during the last month, although fortunately no personal injuries were involved. Five of these accidents involved collisions with trains and two were collisions between track motor cars. It should not be overlooked that collisions of motor cars with trains may result in derailment to the trains, with the possibility of a still greater number of personal injuries.

All men who are allowed to operate motor cars have been examined on the rules relating to their operation. All of them have standard watches; they know the rules for properly clearing trains, for flagging and for speed requirements around curves and other obscure points; and they are familiar with the requirements for observing block signals and track-car indicator signals. Yet accidents continue to occur.

Your own lives, the lives of your men, those of train service employes and of the traveling public depend upon your careful observance of rules. An accident always involves dismissal of the party or parties at fault, in addition to the other probabilities mentioned. Don't take chances. In case of doubt or uncertainty, the safe course must be taken.

How They Happened

A section foreman was overtaken and his car was struck by a passenger train, although he knew that he was on the reported time of a late train.

A section foreman with information that an opposing train was out of a terminal 32 miles away, put his car on the track at 3:45 p.m. and collided with the train 40 minutes later.

A section foreman on a branch line put his car on the track to move to a point five miles away although he was informed that an opposing work extra had left the second station in the direction he was going, but that it had not passed the first station. His car was struck on a curve about three miles from where he started.

A section foreman working in block-signal territory, started for headquarters at 4:15 p.m. He found a track-car indicator signal at stop, sent out a flag and attempted to move his car back to a motor-car set-off, but it was struck by a fast freight.

A signal maintainer and a telegraph lineman were moving in the same direction on track motor cars; the maintainer observed several men at a tool

house, gave a stop signal to the rear car, then got off of his car, leaving it on the track. The lineman did not observe the signal or see the car until too late to stop, a collision being the result.

During a light snow storm, a section foreman left a station to move in a direction opposing a passenger train at a time when this train was due to leave a station 10 miles distant. His car was struck after he had gone 3½ miles.

A roadmaster and a telegraph lineman operating motor cars in opposing directions collided on a curve.

It is creditable that these foremen handled their cars so that there were no personal injuries in the foregoing accidents. However, a serious hazard of train derailment existed in five of these seven cases. All of these accidents occurred within a period of two weeks, and all of them can be attributed to the fact that the men involved failed to observe the rules and instructions governing the operation of track motor cars. All of the men involved in each of the accidents, including enginemen, were investigated carefully. It developed that all of the enginemen acted promptly upon the stop signals that were given them and used every effort to prevent the collisions. Seven men were discharged and one was given demerits.

It is recalled that at one time we had an epidemic of accidents on a division. Instructions were issued for roadmasters and supervisors to check the operation of their cars, and they were advised that they would be held responsible for future accidents involving motor cars. It was only after two roadmasters and one supervisor of bridges and buildings had been dismissed, however, that the accidents ceased to occur. Possibly a renewal of these instructions would be beneficial.

Three More Cases

A section foreman was changing the front axle of his motor car on a station platform, when a motor truck backing away from the depot caught him between the car and the rear of the truck, causing body bruises and scratches, resulting in two days' disability.

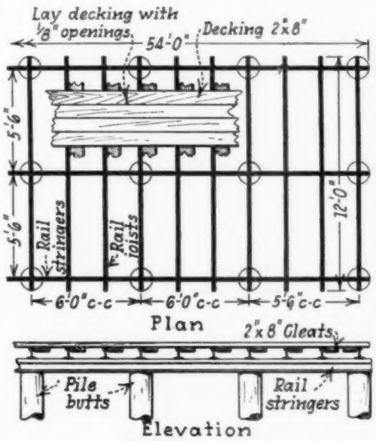
A telegraph lineman moving on double track observed a train approaching from the rear. He believed that he could get to a road crossing about 1,600 ft. distant, to remove his car. He was overtaken and the car was demolished.

A section foreman returning from work stopped his car at the tool house on the time of an overdue train, to unload a keg of spikes and some loose spikes. His car was struck by the train while it was moving slowly in preparation for the station stop. It developed that the foreman had failed to get a line-up of trains from the dispatcher; he also failed to go in on a center passing siding which extended beyond the tool house. At the time of the collision it was snowing.

Investigation developed that in the first of the foregoing instances the motor car was not at a point where vehicles traveled, and that the foreman had just been assisting the driver to transfer some empty barrels from the truck to a baggage truck. After doing this he returned to work on the car, and the driver backed into him without warning. This incident emphasizes the oft-repeated warning never to trust a truck or automobile driver to do the right thing—protect yourself instead.

Building a Transfer Platform with Scrap Rail

AN economical transfer platform which can easily be dismantled in whole or in part and re-assembled at another location, has been built by the Gulf, Mobile & Northern of scrap pile butts, rails and spikes, and planks. The platform, which is 12 ft. wide, is supported on three rows of



Sketch Plan and Elevation, Showing Details of the Platform Construction

scrap pile butts, upon which rest stringer rails, which extend the length of the platform. Joist rails, 12 ft. long, are placed upon the stringer rails at right angles to them, and support a deck of 2-in. by 8-in. planks. The rails are of 45 lb. to 60 lb. scrap rails.

In the construction of the platform, the rows of pile butts are spaced 5 ft. 6 in. apart, center to center, and the individual butts in each row are spaced 6 ft. apart. The pile butts are tamped firmly in place, and cut off three feet above the top of the track rail. The stringer rails are set upon the pile butts, and spiked down by means of two scrap spikes at each butt. The joist rails are then set upon the stringer rails, being spaced 2 ft. apart, except on the end panels where they are spaced 1 ft. 10 in apart. Those joists which are directly over a bent of pile butts, are fastened to each butt by means of two ⅝-in. by 10-in. machine or carriage bolts, one driven on each side of the stringer rail, through two ¾-in. holes drilled in the base of the joist rail. Intermediate joists are bound to the stringer rails with galvanized wire. The planks for the deck are spaced ⅛ in. apart to allow for swell and drainage, and are held in line and spacing by 2-in. by 8-in. cleats underneath, nailed with two 20d nails for each plank and cleat, clinched on the under side.

A typical bill of material for a platform 12 ft. by 54 ft. in area is as follows:

30—pile posts (scrap butts)
510—lin. ft. of scrip rail (45-60 lb.)
3 to 5—pr. of angle bars for joining sill rails
24—3½-in by ¾-in. track bolts
60—scrap track spikes
400—lin. ft. of No. 8, galvanized iron wire
60—scrap ⅝-in. by 10 or 12-in. machine or carriage bolts
60—20d nails
2200 F. B. M.—2-in. by 8-in. plank

This type of platform can be shortened, lengthened or removed easily and, when removed, can be re-erected at another point. Its first cost, and consequently its fire loss, are small, maintenance costs are low, and it is specially adapted for installation in locations that may be temporary.

Inspecting Switches

What measures should be taken to insure thorough inspection of switches and switch stands? What details should receive attention? Should inspections be reported? If so, how and to whom?

Personally and Frequently

By Bernard F. McDermott
Roadmaster's Clerk, Chicago & North Western, Redfield, S.D.

Section foremen should inspect all switches personally and frequently. They should make it a daily practice to test the fit of switch points by opening and closing them, and should examine all of the working parts of every switch once a week, and include the testing of the gage and level through the turnout at this time. The weekly inspection should be reported to the roadmaster on the form provided for this purpose, stating the action taken where defects are found. Too much emphasis cannot be placed on the necessity for a careful, detailed and frequent inspection of switches and switch stands, for turnouts constitute the weakest part of the track and the majority of derailments occur at switches.

Careful and correct maintenance is another point requiring emphasis. Cotter keys should always be in place and bolts should be unworn. If there is lost motion in the point assembly, and particularly in the switch-stand mechanism or at either end of the connecting rod, there is danger that the points may not fit snugly against the rail. A sharp flange on a car or locomotive wheel is quite likely to find an opening of 3/16 in. or more between the point and the rail and result in a derailment and possibly much damage. While provision is made for adjustment of the throw, the foreman should assure himself that the need for adjustment does not arise from worn bolts or other connections. If it does, replacements should be made immediately and the adjustment then completed. Particular attention should be given to the condition of the ties, especially at the heel of the points, and to the relative elevation of the ties supporting the points to insure that the points do not rise as wheels pass across the heels of the points. There are many other items—in fact every part of a turnout requires close scrutiny—that should be examined, but those that have been mentioned are of vital importance.

On Every Trip

By A. E. Perlman
Engineer Maintenance of Way, Denver & Rio Grande Western, Denver, Colo.

An inspection of switches and switch stands should be made by the foreman or the track inspector on each trip over them, to ascertain whether anything that might damage them or affect their operation has dropped into them; whether all bolts are tight; whether slide plates and spring-frog plates are oiled; whether the stand is fastened securely to the head blocks; and to make certain that the target and the switch lamp are properly alined with the track. The points should also be thrown to insure that they fit properly against the running rails without putting undue stress on the switch stand. If any defects are found which the foreman or the inspector cannot repair, he should report the details to his superior officer by wire. The roadmaster or supervisor should make a similar detailed inspection once a month and submit a report to the division engi-

Send your answers to any of the questions to the What's the Answer editor. He will welcome also any questions you wish to have discussed.

To Be Answered in March

1. *What practical means can be employed to clean stone ballast at railway crossings subject to heavy traffic? To keep it clean?*
2. *When preparing bills of material for new buildings or for the repair of existing structures, to what extent is it practicable to specify short lengths of lumber? What are the advantages? The disadvantages?*
3. *Can one start too early in the spring to pick up track? Why? If so, what are the effects? Does the kind of ballast make any difference?*
4. *What preparations should be made during the late winter and early spring to prevent damage to bridges and culverts by spring floods?*
5. *What practical methods can be employed to protect embankments from wave action during periods of high water?*
6. *What is the best method of removing water from scale or other pits where the cost of a drainage line is prohibitive?*
7. *What advantages, if any, are there in concentrating the renewal of ties in gangs organized and equipped specifically for that purpose? What disadvantages?*
8. *What causes paint to fail on brick surfaces? What form of failure is most common? How can the trouble be overcome?*

neer on the form prescribed for this purpose.

In automatic signal territory, the foreman and signal maintainer should go over all main-line switches jointly, once a year, removing the connecting and head-rod bolts, inspecting them for lubrication and wear, and replacing any that may be necessary. At the same time an inspection should be made of the switch-circuit controllers to make certain that they are in adjustment. A report of this inspection should be made to the roadmaster and signal supervisor.

Accidents Reveal Defects

By F. J. Liston
Roadmaster, Canadian Pacific, Montreal, P.Q.

Switch inspections may be classified in three general ways: the daily examination by the track walker who works under the section foreman; the weekly examination by the foreman, who reports to the roadmaster; and the monthly or quarterly inspection by the roadmaster, whose report goes to the division engineer. Apart from these general routine inspections, the roadmaster should make random tests daily while traveling over his district, and impress upon his forces the high importance of constant and watchful attention to the details of the turnout assembly, as well as the necessity that the reports from both the track walker and the foreman reflect the actual conditions as they found them.

Accidents invariably reveal defective maintenance and demonstrate the importance of inspecting switches regularly, frequently and thoroughly to detect worn or defective parts promptly before they have had an opportunity to cause an accident. Such an inspection cannot be permitted to become casual or perfunctory. Rather, it must be so searching that no defect will escape attention or be allowed to develop further, for it is only through constant and conscientious maintenance that accidents resulting from inferior maintenance can be avoided. Every accident arising from this cause is avoidable and reflects not only on those concerned, but upon the whole department.

Many foremen, having only a few switches, never become really expert in switch work and, while they cannot be relieved of any responsibility for maintaining their switches to a high standard, it is the roadmaster's duty to carry on an intensive campaign of education among them, grounding them thoroughly not only in the fundamentals of switch work, but in the details as well. He should also constantly refresh the memory of those that are more experienced, calling attention to the requirements of the standards of the road, giving an explanation of the effect of deviations from these standards. He should encourage a thorough study of standard layout plans and of practices of switch maintenance through the reading of magazines and books dealing with this and other maintenance subjects. In this way his foremen will acquire a basic knowledge of switch and track maintenance and be able to take advantage of the experience of men of recognized ability.

The details that should be given attention during a switch inspection should include the condition of the ties; the amount of bend and wear in the stock rail; the condition of the switch stand, of its fastening to the headblocks and of the hook or lock securing it; the throw of the stand; the condition of the connecting rod, the front rods, the switch-point lugs and the bolts in each; the fit of the points against the rails; the actual throw of the points; the distance between the stock rail and the heel of the point; the condition of the riser and heel plates; the security and effectiveness of the foot guards; the wear on spring frogs; the adjustment of the springs and of the hold-down assembly; the fit of the spring rail; the guard-rail gage; the gage of the track; the general line and surface through the turnout; the amount of rail creepage; and, of paramount importance, the absence of or wear on bolts, rivets, and other fastenings, as well as the absence of cotter keys.

Creosoted Wood for Sash

Is it feasible to use creosoted wood for the construction of window sash? If not, why? If so, what are the advantages? For what service are they best adapted?

Reduces Maintenance

By G. P. Palmer
Engineer Maintenance and Construction, Baltimore & Ohio, Chicago Terminal, Chicago

When our Lincoln Street enginehouse was constructed late in 1915, the windows were fitted with steel sash. This sash deteriorated to such an extent that we found it necessary to renew it in 1925, after a little less than 10 years' service. This deterioration was caused primarily by the gases which are usually found around enginehouses and which are particularly destructive to metals. Preliminary to making the renewal we studied the use of wood sash and found that the additional cost for treatment would be small in comparison with the total cost of the work; and we decided to treat both the frames and sash. These creosoted sash have been in service since 1925 and today are practically as good as when installed.

The original steel sash required frequent painting, and replacement of the glass was often made necessary by the expansion and contraction of the steel. At the time the sash was removed, practically every pane of glass was either broken or cracked. Since the treated wood sash has been in service, renewal of glass has been limited entirely to such panes as have been struck by objects. These panes are held in place by treated wood beads tacked in place with copper nails.

From a maintenance standpoint we consider that the treated-wood sash has been a good investment, although the first cost was about 50 per cent more than for steel sash. There is, however, one objection to wood sash, this being that the glass area per window has been reduced considerably compared with the steel sash, with a corresponding reduction in the day lighting of the enginehouse. The remedy for this in new construction is to increase the size of the window openings. When we replaced the steel sash with the wood sash we did not change the size of these because of the additional expense involved.

The wood sash in this building is now 13 years old. So far, it has required very little expense for glass, parts or painting, and it does not now require any repairs.

Entirely Feasible

By L. H. Harper
Superintendent, American Lumber & Treating Co., Macon, Ga.

Strictly speaking, it is not feasible to construct window sash out of creosoted wood because of the objection to using expensive woodworking machinery for this purpose. On the other hand, it is entirely practicable to give window sash a regular pres-

sure treatment with creosote. The advantages are that the wood is thoroughly protected against decay for a long time, and the sash does not require painting. Obviously, however, creosoted window sash are not suitable for certain uses where the color or the odor of the preservative is objectionable. In such places, the use of one of the so-called clean treatments will overcome these objections for they are odorless and permit the wood to be painted the same as when untreated.

Creosoted window sash are adapted particularly for use in enginehouses where these objections do not apply and where the constant moisture soon causes decay in untreated wood and the moisture and locomotive gases have a severe corrosive effect on metal sash. About 15 years ago the Central of Georgia, with which I was then connected, used creosoted wood sash in an enginehouse then under construction at Columbus, Ga. These sash are still in service and have required no maintenance. Since then, a considerable number of creosoted wood window sash has been used in enginehouses and shop buildings at other points on the system, with most satisfactory results. These sash were all made of dense southern pine.

Fires in Coaling Stations

What provisions should be made for fire protection and for fighting fires at coaling stations?

Cleanliness Vital

By Frank R. Bradford
Director of Safety and Fire Protection, Boston & Maine, Boston, Mass.

During the last 10 years, fire losses in coaling stations have aggregated \$900,000, an average of \$90,000 a year. This indicates only in part the importance of preventing fires in these plants and of adequate provision for fighting them if they do get started. Only in part, for destruction of a coaling station may interrupt or delay train operation seriously and add materially to the loss sustained in the destruction of the physical property.

The first element in fire prevention is cleanliness. While fires in coaling stations have resulted occasionally from improperly installed or maintained lighting, power or heating equipment, or from spontaneous combustion, by far the larger number result either directly or indirectly from rubbish or untidiness. The match, cigarette, or heel from a pipe, when dropped into the coal, seldom starts a fire, but dropped into a pile of lunch papers, dirty waste or greasy overalls, it is quite likely to start a blaze.

Cleanliness in a coaling station means the elimination of everything except the coal itself and the equipment for handling it. The office, rest room, toilets, locker room, tool room and shop should be in a detached building where a fire will not interfere with the operation of the coaling facility. The carrying of newspapers and lunches into the headhouse or machine room, playing cards between jobs in the operator's cabin, or hanging clothes in boxes and cupboards or in out-of-way places in the main plant is practiced only where proper and convenient facilities for these activities have not been provided. Yet these are all practices that induce untidiness and set the stage for fires in the coaling plant.

Spontaneous ignition of the coal occurs sometimes, but more often what is termed spontaneous ignition in the coal originates from rubbish, wiping rags or other foreign material that has been dropped into the hopper. Certain kinds of coal, and coal from particular localities, are commonly subject to real self ignition. The safe handling of these coals requires special equipment, usually to handle it directly from the cars to the locomotive tender without intermediate storage. Coal that has not given trouble from heating in the past probably will not do so, provided easily inflammable rubbish is kept out of it. Open-flame torches for illumination, for softening grease in cold weather and for thawing frozen coal may be necessary if other and safer means are not provided, but such use increases the fire risk, which becomes a still greater hazard if rubbish is present.

If the structure is built of noncombustible materials or if the timber of frame structures is reasonably sound, there is little danger from locomotive sparks, provided there is no accumulation of rubbish, rags or birds' nests in which sparks may lodge. The same is true of the machinery and other operating equipment; if it is kept clean and in good order it will not start a fire. In other words, cleanliness is in itself the best fire preventive.

If the coal becomes ignited, the best thing to do is to dump it, spread it thinly and apply plenty of water or isolate the burning portions. Water applied to the surface of a large pile or hopper full of coal with a deep-seated fire is generally ineffective. Most fires in coaling plants, if discovered early enough, can be put out with water from extinguishers or small hose lines. If water under pressure is available, hydrants with 1½ in. hose or standpipe systems with short lines of 1½-in. or garden hose at accessible places throughout the structure, make ideal first-aid equipment. Unless a well-manned and trained fire brigade is on the premises, large hose lines should not be provided, for they cannot be handled by the local coaling-plant crew. In some types of structures and with a favorable water supply, automatic or deluge sprinklers may be installed, which will assure practical immunity from destructive fires.

In large stations of combustible construction, fires escaping beyond the scope of first-aid control are likely to result in extensive damage, even against the efforts of an efficient fire department having plenty of water available. For this reason, an automatic fire-alarm system that will give the earliest possible notice of the fire, is highly desirable. It is also important that adequate means of access to the plant be provided for fire-department apparatus, for the handling of long lines of hose is a slow process at best and obstructions by trains, locomotives or cars may result in serious delay in reaching the fire before it is out of control.

If the plant must of necessity be located where a fire department is not available, or the volume of pressure of the water is insufficient, it should be made free from the danger of destruction by fire by non-combustible construction, with the coal storage divided into relatively small units which can be dumped readily.

Enforce Fire Rules

By General Inspector of Buildings

If fire prevention rules are enforced there should be little fire hazard around a coaling plant. In common with almost all other railway buildings, the greatest fire menace is an accumulation of rubbish, oily waste and rags, old paper and other inflammable material. Oil-soaked rubbish is always susceptible of spon-

taneous combustion, while any inflammable material may be ignited by carelessness in throwing lighted matches or cigarettes away. In other words, cleanliness is a paramount element in fire prevention; and cleanliness is usually a matter of rigid supervision. To put it another way, if supervision is good the fire hazard from external causes will be reduced, while laxity in this respect will increase it.

Spontaneous combustion of the coal itself rarely occurs after it is placed in the coaling plant, for the turnover is generally so rapid that it is given no time to heat up to the point of ignition. Cases have been known, however, where coal has been ignited through the use of an open-flame torch, or because some one has thrown a wad of oily waste into a pocket or corner of the coal storage space.

In several cases that have come to my attention fires have been started through ignition of the finely divided coal dust that sometimes fills the atmosphere of the storage bins. To prevent this, provision should be made for ventilation to overcome this hazard. Open lights should never be allowed where they can come into contact with this dust, and if motors are installed they should be enclosed so that sparking will not ignite the dust. These are also matters of supervision, which may not only save the plant from destruction but also possible death or personal injury to the attendants, for a coal-dust explosion may be violent and is usually followed by fire.

If a fire does start in the coal, the most sensible thing is to open the gates and let the coal run out of the bins onto the ground where the fire can be extinguished either with water or by isolating it with shovels, keeping the pile spread out thinly.

Minimum Weight of Rail in Yards

What considerations determine the minimum weight of rail that should be used in yard tracks? In leads and running tracks? In ladders?

Standards Higher

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

This question deals with a subject that is not always given the consideration its importance warrants, for yard tracks should be maintained to a higher standard today than ever before, since trains and cars are being moved through yards at higher speeds and since wheel loadings are heavier today than they were only a few years ago. In other words, the demands on the track are greater today than formerly and to meet these demands stronger track and better maintenance are necessary.

Competition is keen and every minute counts in the movement of traffic. Delays in yards require higher speeds out on the line or they nullify the efforts that are being made to shorten the time between terminals. Delays resulting from bad track conditions are practically indefensible; yet dependable track cannot be maintained without materials that are able to withstand the usage they must receive. This requires that the rail must be of sufficient size to permit safe operation, the elimination of derailments resulting from track defects and the maintenance of good line and surface without too much labor.

Leads and running tracks should be laid with released rail of good quality, say No. 2, from main-line tracks, on tie plates and sound ties, and should be anchored with an adequate number of anti-creepers. The heaviest and best rail available should go into the ladders. These tracks constitute the heart of the yard and ordinarily receive the greatest amount of wear as well as the greatest abuse. A busy ladder is not only difficult to maintain, but the opportunities for working on it are often limited, so that it should be of the strongest construction. To insure the proper fit of switch points, frogs and guard rails, No. 1 quality rail should be used.

Use Heavy Rail

By Engineer Maintenance of Way

For years the most serious defect in yard construction was the use of light rail, often of a quality bordering on scrap. Some years ago, as a division engineer, I had a busy yard laid almost entirely with 51-lb. rail rolled in 1876. As the bulk of the traffic was coal, this yard was always in deplorable condition. Yet when I talked to the chief engineer about heavier rail he told me that the need for released rail on branch lines was so great that he had none to spare for yards and that, anyhow, my predecessors had gotten along with the rail and he would expect me to do so. I mention this instance because it illustrates a point of view that still exists in some quarters that almost any kind of rail will do for yard tracks.

The leads and running tracks in many yards carry as much and sometimes more traffic than the main tracks. While the speeds are generally lower, the standard of maintenance should be but little below that for the main line. These tracks should, therefore, be laid with a good quality of released rail from the main tracks. The body tracks do not get such severe usage, but in the interest of economical maintenance I would bar any rail lighter than 85-lb.

Ladder tracks are not only used constantly, but by the very nature of the service they perform they receive much abuse. The wear on frogs, switches and turnout rails is severe, the track tends to get out of gage, line and surface and to cut into the ties. The progress of these defects is much more rapid with light rail and the cost of maintenance rises correspondingly. For this reason, ladders should be laid with the heaviest rail available and of the best quality. In fact, the labor cost of maintenance can usually be reduced sufficiently by the application of heavy rail on a busy ladder to more than offset the cost of new rail for this purpose. In any event, I am convinced that it is a good investment to lay a busy ladder with 112-lb. rail.

Depends on Traffic

By P. O. Ferris
Acting Engineer Maintenance of Way, Delaware & Hudson, Albany, N.Y.

Probably the most important factor affecting the minimum weight of rail for yards is the amount and kind of traffic passing through the yard. In general, however, the weight of the rail that is applied in yard tracks is governed quite largely by the weight of the rail that is available through release from main-line and branch-line main tracks. The best of this rail should be selected for use in important leads and running tracks, since these tracks must be maintained as nearly as practicable to the standard of strength required for main tracks.

Ladder tracks do not ordinarily need as heavy rail as the leads and

running tracks, since the movements over them are generally made at relatively low speeds and they are seldom subjected to movements of heavy locomotives. The rail in ladder tracks should, therefore, be of sufficient size to support the static wheel loads, with a reasonable factor of safety, the magnitude of which will depend on the tie and roadbed conditions.

Preventing Ice on Tracks

What precautions can be taken to prevent the accumulation of ice on tracks at water stations? Who should do this?

Requires Supervision

By R. L. Sims
District Maintenance Engineer, Chicago, Burlington & Quincy, Galesburg, Ill.

To prevent the accumulation of ice on tracks at water stations requires close supervision. Enginemen should be given to understand that in filling engine tanks they must not be allowed to overflow. To provide drainage to dispose of any water that may reach the track either during the process of filling the engine tank or after the spout is removed from the manhole, a catch basin should be placed under the spout with channels leading from the track. It is equally important that these channels be kept open and that the opening into the catch basin be kept free of ice so that the water can drain away before it has time to freeze.

Tracks adjacent to water cranes should be well filled with clean ballast to insure that overflow water will get away quickly. The road foreman of engines should be charged with the responsibility for seeing that enginemen or others do not overflow engine tanks at water cranes. The waste water not only creates a bad ice condition on the track at the water station, which is undesirable, but the ice formed on the engine tank may also have an undesirable effect.

Stop Waste

By Engineer Maintenance of Way

Accumulations of ice on the track at water stations are entirely avoidable, all that is required to prevent them being persistent and rigid supervision. In other words, in all but a negligible number of cases such accumulations are the result of carelessness on the part of the fireman when taking water. It is true that occasionally a water-column valve will be found to be leaking, but an alert foreman will have this attended to at once. Since the road foreman of engines is on the road constantly and sees the enginemen on the district frequently he should be charged with the responsibility of seeing that engine tanks are not overflowed when water is taken and that the valves are fully closed before the cranes are swung back into normal position. To avoid water hammer, the valve control of water columns is so designed that the water cannot be shut off instantly, but requires a period of 20 to 30 seconds for the closing of the valve. If the engine tank is filled completely before the water is shut off the tank will overflow.

While drainage is desirable and should be provided at all points where water is taken, the basic trouble is that of wasted water. Catch basins, either between tracks or at some convenient point near the water column, should be installed to carry any water that is wasted, before it can freeze, and suitable channels should be provided as necessary to carry the water quickly to the catch basins.

Air-Lift Pumping in Winter

What difficulties, if any, are met in air-lift pumping during the winter that are not encountered in warm weather? What can be done to overcome the trouble?

Moisture May Be Deposited

By C. R. Knowles
Superintendent Water Service, Illinois Central, Chicago

Winter operation of air lifts offers no particular difficulties so far as the operation of the air lift itself is concerned. On the contrary, the compression of the air is more efficient during the winter months than during the summer by reason of the lower temperatures. As an example, a difference of 20 deg. in temperature creates a difference of about 4 per cent in the cost of compression. Where moisture is carried over into the compressed-air line it may be deposited and cause trouble if it freezes. This can be avoided by protecting the air line from freezing or by removal of the moisture from the lines. Removal apparatus should be placed as near as practicable to the compressor and ahead of the air receiver.

Only in Air Lines

By George L. Davenport
Assistant Engineer, Atchison, Topeka & Santa Fe, Los Angeles, Cal.

Air-lift pumping in winter involves no difficulties in the well itself, or in the handling of the water discharged from the well. However, difficulties are often encountered during severe low temperatures, in the air lines leading from the compressor to the well, particularly where the compressor is located at some distance from the well. Normally, the air which has been heated during compression is cooled to atmospheric temperature during passage through the pipe line. Air lines are preferably placed above the ground to facilitate inspection for leaks and to keep them free from soil corrosion. For this reason, in cold weather the water vapor that goes over with the air will freeze in a long line and the strainers placed ahead of control needle valves may break.

The remedy is to insulate long exposed air lines up to the point where they enter the well. As an alternate, the line may be buried, but the cost of protecting pipe against soil corrosion and the difficulty of detecting leaks makes this method less advisable.

Is High in Moisture

By Water Service Inspector

When discharged from the compressor air has a high moisture content, often to the point of saturation. If this vapor is subjected to low temperature it is obvious that it will freeze. In general, on short runs of pipe the temperature of the air is sufficient to keep it above freezing during delivery to the well, but on long runs it may cool down sufficiently to

deposit a considerable part of the vapor in the line and eventually the line will freeze.

The most satisfactory remedy is to extract the water vapor from the air before it is delivered to the pipe line leading to the well. This can be done by placing an after cooler of adequate capacity between the compressor and the receiver. Experience has shown that in this way air of sufficient dryness can be delivered to the transmission line to avoid freezing of the line and strainers. Special precautions should be taken, however, to protect the lines and valves where they connect with the well head, as freezing is more likely to occur at this point than elsewhere.

Cold air weighs more than the same volume of warm air, while the cooler intake air during the winter months causes less generation of heat during compression, and the colder water in the compressor jackets and intercooler is more effective. On the other hand, more power is required to compress the heavier air, so that while the heavier air will do more work when compressed, say about 1 per cent for every 5 deg. drop in temperature, the overall efficiency of the pumping varies within quite narrow limits between summer and winter.

Materials for Blast Plates

What materials are suitable for protecting overhead structures against the effect of locomotive blasts? What are their relative merits? How should they be placed?

Blast Plates Best

By P. G. Lang, Jr.
Engineer of Bridges, Baltimore & Ohio, Baltimore, Md.

Locomotive blast is always accompanied by cinders that are expelled from the stack with considerable velocity. Also among other elements, locomotive gases and smoke contain sulphur. Overhead structures usually trap the cinders and smoke, and the effect on the structure is not improved by atmospheric moisture, condensation and rainwater. The best expedient for protecting these structures from the effect of this blast of gases and cinders appears to be the installation of blast plates.

These plates should be placed centrally over the track and should not be less than 4 ft. in width. Many substances have been used for such plates, the obvious requirements for this service being relative chemical inertia to dilute sulphuric acid and physical capability of resisting the abrasive action of the cinders in the blast of locomotives. Composition board of asbestos and similar materials has been used, but plates composed of such substances are difficult to attach to the structure.

From some standpoints malleable cast iron is satisfactory, but it is rather expensive and plates of this material are not easy to attach. The best solution appears to be the use of wrought iron, combined with modern-process welding. This welding should be so carried out that the connections will be entirely protected from blast by the plate. Such an arrangement is essential, obviously, regardless of the material used, but with many substances it is quite difficult, if not impossible, of attainment.

Wrought Iron Effective

By G. L. Staley
Bridge Engineer, Missouri-Kansas-Texas, St. Louis, Mo.

Cast-iron, wrought-iron or steel plates, steel or iron sheets, asbestos board and wood are the materials most generally used beneath the decks of structures over railway tracks for protection against locomotive blasts. Cast iron has proved to be effective so far as resistance to erosion from both the gases and cinders that compose the blast is concerned, but if made thick enough to prevent cracking from vibration the plates are so heavy that difficulty is experienced in holding them in place.

Wrought iron is effective and is more generally used than other materials at present because of certain advantages it possesses. It can be made light in weight and still possess sufficient strength for the service it performs, and it is easily attached to the structure. The fastenings should also be of wrought iron, made oversize to reduce to the minimum the danger of coming loose and causing danger to trains or injuries to persons. Some alloys are now available that give promise of equal or better service than wrought iron.

Some installations of asbestos board have been made, generally in the form of corrugated board. These more properly fall in the class of experimental or test applications at present, for their resistance to bending, and the permanence of the fastenings and of the material itself in this service are not yet well known. Wood planks can be used and, while such an installation would be more or less temporary, it will serve the purpose for a time. They are light in weight and are easily attached.

Should Be 4 Ft. Wide

By J. S. Huntoon
Assistant Bridge Engineer, Michigan Central, Detroit, Mich.

While the protection of overhead structures against locomotives blasts is necessary, its importance depends on the distance between the structure and the top of rail, the gradient of the track passing under it and the frequency of the passage of trains. In general, where the overhead clearance is less than 22 ft., the underside of the floor of concrete, steel and wood bridges should be protected from locomotive blasts.

It is not the general practice to protect the underside of wood stringers of overhead bridges; yet I have observed stringers on which the wood on the underside had been reduced as much as 3 in. by locomotive blasts, making it necessary to renew them because their strength had been reduced by this abrasion, although the remainder of the timber was sound. Heavy-tonnage trains operated over steep ascending grades always have strong locomotive blasts that will cause attrition to the underside of a bridge, regardless of the material of which it is constructed. I have in mind several instances where such operating conditions made it necessary to renew a steel bridge floor about once every seven years. Where trains are operated infrequently and at low speed on branch lines, blast protection may not be necessary.

Any form of blast protection should be at least 4 ft. wide, measured transversely of the track and it should extend the full length of the structure, measured along the track.

Cast-iron blast plates have been used extensively, particularly for protecting concrete surfaces. Cast-iron lugs project from one side of the plate, which is placed in the concrete form so that the concrete can be cast around the lugs to hold the plate in place. This form of blast plate has rendered good service and will probably last during the life of the structure. It should not be too large in

size or less than $\frac{5}{8}$ in. thick to avoid breakage from vibration. One of the most important requirements for this form of blast plate is that the lugs shall be of sufficient size and of such design that they will be embedded in the concrete and can be fastened securely so that the plates will not work loose and fall on the track or a train.

Structural-steel, wrought-iron and copper-bearing steel plates have been used to protect bridge floors from locomotive blast. Steel plates for this purpose should not be less than $\frac{3}{4}$ in. in thickness. Structural steel plates have resisted locomotive blasts for as long as 12 to 15 years. Wrought iron and copper-bearing steel plates have been used for this form of protection only in recent years, so that records of the service life of these materials are not yet available.

In recent years, sheet lead has been used for locomotive blast protection. Where this has been done the results have been quite satisfactory. At one point on the Michigan Central, a sheet-lead blast plate $\frac{1}{8}$ in. thick has now been in service for nine years and it is expected that it will last about five more years. Sheet lead has the advantage that it can be fastened easily to floor members of almost any material or shape, that is steel I-beams, the built-up flanges of girders or wooden stringers. It can be bent around the flanges of beams or girders to reach up onto the web, and can be bolted to the web at any desired interval. The surfaces in contact with the lead can be coated with roofing cement or some other liquid coating as a precaution against the entrance of moisture. Sheet lead bent for application to the underside of wooden stringers should extend well up on the vertical surfaces and be nailed along these surfaces with copper nails. Lead sheets to be used for blast protection should not be less than $\frac{3}{16}$ in. thick.

Elevating Curves for Low Speed

Should curves on industry, house or other low-speed tracks be superelevated? Why?

A Small Amount

By T. M. Pittman
Division Engineer, Illinois Central, Water Valley, Miss.

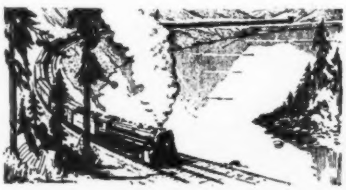
Excessive elevation on low speed tracks leading to industries and other points where movements are primarily in switching service, is far too common. Superelevation is necessary for speed, the amount demanded varying with the speed. Excessive elevation on low speed tracks takes the load off the pony trucks and creates a tendency for them to mount the high rail. It also throws a heavier load on the low rail and causes undue wear on this rail and on the ties. Where drainage is not good, and this is a common condition on tracks of the class that is under discussion, the low rail will settle and thus increase the elevation of the outer rail. If this occurs at a joint, the chance for a derailment is increased considerably.

Theoretically, the track should be practically level for the speeds usually maintained, but if no elevation is applied, the pony trucks will bind against the outside rail, putting a heavy strain on the outside spikes, thus tending to spread the track. In actual practice, however, it is desirable to give these tracks a slight amount of superelevation, and experience has indicated that about $1\frac{1}{2}$ in. is the correct amount for the sharper curves. This should be reduced as the curvature decreases, so that a curve of, say, 10 to 12 deg. will have an elevation of 1 in. Many turnouts have lead curves as sharp as 10 to 12 deg. with no elevation, and no serious difficulty is encountered with them. A little elevation would tend to relieve the strain on the spikes and thus reduce the tendency to spread. This not only makes the locomotive take the curve better, but reduces the cost of maintenance.

Sees No Need

By E. P. Safford
Supervisor of Track, New York Central, Silver Creek, N.Y.

Curves on house, industry and other low-speed tracks should be maintained level or with very little elevation. Superelevation is used to counteract the centrifugal forces set up by speed, and where the speed is so low, as on the tracks under consideration, that centrifugal force is practically non-existent, there is no need for superelevation. It will be found that where these tracks are maintained with little or no elevation, both surface and gage will be more easily kept under control. This will be especially true where there is insufficient ballast or an unstable subgrade. Without superelevation there will be less tendency for the inner rail to settle out of level.



Opinion Divided

By District Engineer

This is a controversial question upon which opinion seems to be about equally divided. For this reason, each case should be decided in the light of local conditions. In discussing this subject, I have found that the proponents of one practice or the other are able to support their contentions with facts that seem to them to be sufficient to support their cases. Speeds through the tracks mentioned in the question seldom exceed 10 miles an hour, so that centrifugal force does not become a factor.

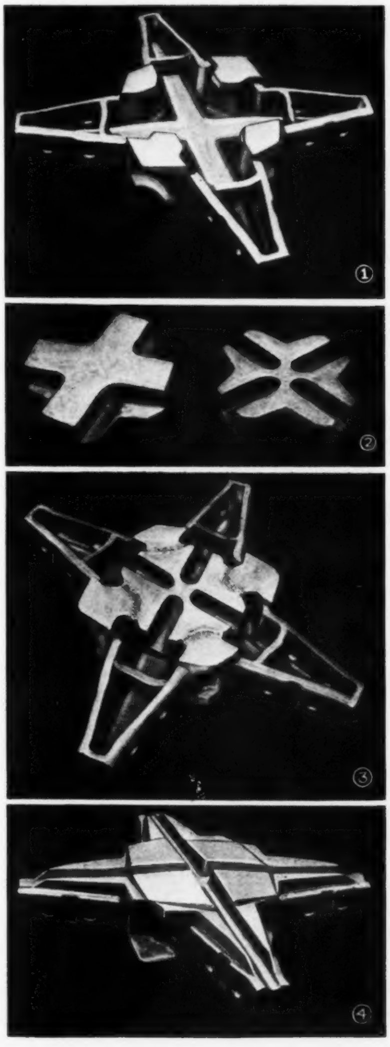
From my own experience, I would not elevate tracks having light curvature. On the other hand, a four-wheeled truck having parallel axles will always bind against the outer rail of a curve. For this reason, as the curvature increases, a small amount of elevation should be introduced to reduce this action and thus reduce the tendency of the track to spread. Just where the dividing line is between no elevation and some elevation, is difficult to say, but probably around 3 to 4 deg. If the track is alongside a loading or an unloading platform it is better to keep it level regardless of the rate of curvature.

While it is indisputable that a car will move more easily around a curve with some elevation, too much is worse than none, for with too much the low rail is certain to settle faster than the high rail, thus increasing the elevation. Where cars are pulled from loading tracks before loading is completed, it often happens that all or most of the load is on one side, in which case there is a tendency for the car to climb the rail if the load happens to be on the low side. If not more than 1 in. of elevation is applied, however, the tractive force needed to move the car will be reduced, and the small difference in the elevation of the rails will not throw an undue amount of the load on the low rail.

PRODUCTS of Manufacturers

Depth-Hardened AMSCO Crossings

AS the result of engineering and foundry experiments, checked by inspections of castings in a 400,000 volt X-ray laboratory, and verified by numerous service tests under actual traffic, the American Manganese Steel Division of the American Brake Shoe and Foundry Company, Chicago Heights, Ill., is presenting a new AMSCO manganese steel "depth hardened" crossing of a unique design.



1—Bottom View of a Quarter Casting Before Inserting the Reinforcing Grid. 2—Top and Bottom View of the Reinforcing Grid. 3—The Quarter Casting With the Grid Welded in Place. 4—Top View of the Rough Casting, Showing Tapered Pads Cast on the Receiving Surfaces

In the depth hardening process, which is claimed to impart additional life and toughness to the wearing surface of the crossing, the crossing units are cast with excess manganese steel on the wearing surfaces, tapering back from the points. The units are then rough ground, after which they are placed under a steam hammer with a special round hardening face that is brought to bear on the castings surfaces to concentrate the blow along a line instead of over a wide area. With this hammer, the excess metal on the points and for a short distance back of them is hammered to a height slightly greater than the rail height, the difference being removed in the finish grinding.

It is stated that through this process a hardness penetration is produced on the points and receiving surfaces that extends far below the depth of service wear, that the resultant hardness is equal to that resulting from months of actual service and that the process anticipates the normal plastic flow of manganese steel and eliminates the necessity for the early grinding that otherwise would have to be done in the track.

The new crossings are also designed to provide reinforcing in the box-like section under the points and flangeways to prevent fatigue cracking from repeated flexing of the castings under passing trains. This reinforcement is provided by welding a special supporting member in the under side of the casting before it is subjected to the hardening process.

It was found by examination in the X-ray laboratory of many designs which were tried, that attempts to provide such reinforcing in one integral casting had a tendency to produce shrinkage cavities which would lessen proper service wear. It is claimed that by casting the crossing with equalized metal sections throughout and welding the reinforcement in place, a principal source of unsound metal is eliminated.

A Service View of a Finish-Ground "Depth-Hardened" Quarter Crossing

"Depth hardened" crossings in reversible quarter, solid-quarter and half-crossing castings of standard types are now available through trackwork fabricators.

A New Idea in Rail Joints

THE "Wedge" joint is the name that has been given to a type of rail joint that has been under test on several roads for periods up to four or five years, and that is now included in the rail joint tests that the American Railway Engineering Association is conducting on the Atchison, Topeka & Santa Fe, near Toluca, Ill. The joint, the fundamental feature of which is an arrangement of parts designed to eliminate motion between the bars and the rail under traffic, embodies a pair of joint bars of special toeless design, which are held in place against the rail by means of bolts and coil spring washers and two pairs of specially-shaped wedge

blocks. The wedge blocks, as shown in the accompanying illustrations, are applied over the two center holes of the bars nearest to the ends of the abutting rails, their lower wedge-shaped faces being drawn in between the top of the rail base and the specially sloped lower rib of the bars.

The wedge joint was designed primarily to overcome the poor fit of joint bars that arises from the fact that the fishing heights of adjoining rails are not always the same. Where variation occurs in this respect, the usual method of bolting up bars with a straight top fishing surface results in a tight fit of the bars against the rail with the smaller fishing height, but a perceptibly looser fit against the rail with the greater fishing height, at least for some distance from its end, the exact distance depending upon the difference in the fishing heights and the degree of lateral flexibility of the bars under the bolt pressure applied.

The bars of the wedge joint assembly can be of almost any form of the toeless type, except that the underside of the outer edge of the lower rib must be beveled to the proper angle to receive the wedge blocks. Another factor in the assembly is that the use of the wedge blocks calls for longer bolts for the two center bolt holes.

As shown in the sectional view of the joint, the wedge blocks are so designed that, with a fulcrum at their top line of contact with the bars, tension put in the bolts that pass through them causes the lower wedge faces of the blocks to be forced between the beveled base of the bars and the top of the rail base. The inward pressure on the bars at the top, combined with the resultant upward and inward force on the base of the bars, brought about by the wedges, causes them to be drawn inward at the top, into tight contact with the heads of both rails, regardless of any slight variation in the fishing heights of the rails.

In view of this action, it is claimed that the wedge joint adjusts itself automatically to the rails under the application of proper bolt tension, compensating for any irregularities in the dimensions of abutting rails and insuring that the heads of both rails will be in full contact with the heads of the joint bars. Through this continuous tight contact, it is claimed that motion between the joint parts, with attendant abrasion and wear, is reduced to a negligible factor, thus prolonging the life of both the bars and the rail, with less joint maintenance. The wedge joint, which is covered by patents, was developed by E. W. Caruthers, assistant engineer, Pennsylvania.

Left—Section of the "Wedge" Joint Assembly. Right—One of the Joints as Applied to the Rail

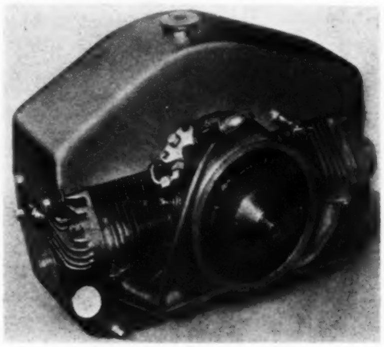
Improvements in Portable Power Saw

THE Reed-Prentice Corporation, Worcester, Mass., has developed a two-cylinder, four-cycle, air-cooled gasoline engine, which, while designed particularly for the operation of this company's portable timber saw, may be used as a source of power for many other railroad uses, particularly where weight is an important factor.

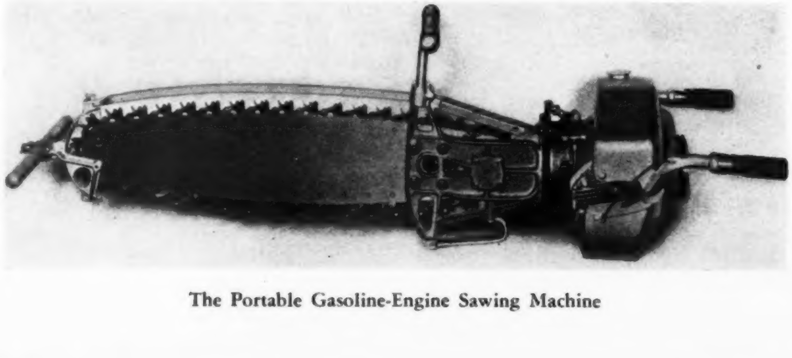
The new engine, known as Model 25, weighs 45 lb. and is of the horizontal, opposed two-cylinder type, developing 5 hp. at 2,800 r.p.m. The cylinders, which have a 2½-in. bore, are of aluminum cast solid on the crank case, with suitable liners and valve inserts pressed in. The pistons have a 2½ in. stroke and a displacement of 25 cu. in. Roller bearings are used for the connecting rod and main bearings and a positive pump and spray oiling system is fed from a 1½ pint oiling chamber. The engine is equipped with a Stromberg carburetor and a Scintilla magneto furnishes the ignition. The engine is air cooled by a flywheel fan and long aluminum fins on the cylinders.

The power take-off is directly from the end of the crankshaft by means of a durable clutch. The driven unit is mounted on the engine by a clamp ring on the front face of the clutch housing, insuring alinement and rigidity without the use of a base. The engine is started by cranking it with a rope pulley in the same manner as an outboard motor. The gasoline consumption with this engine is 0.54 lb. per brake horsepower hour.

With the exception of the power plant, the saw is essentially similar in construction to the saws manufactured by this company, described in previous issues of *Railway Engineering and Maintenance*, and can be equipped for one- or two-man operation by removing or attaching the handle at the end of the saw. The saw is available in 16, 24 and 36-in. capacities weighing complete with motor 75, 80 and 95 lb. respectively. A swivel frame construction is provided, permitting the saw to be set and locked in a vertical, horizontal or angular position as required. Clutch, ignition and gas supply are controlled by the handles at the motor end. A grease gun is provided for oiling the saw chain.



The New Reed-Prentice Gasoline Engine



The Portable Gasoline-Engine Sawing Machine

NEWS of the Month

40 Per Cent Increase on Streamlined Twentieth Century

The first six months' operation of the New York Central's new streamlined Twentieth Century Limited brought an increase of approximately 40 per cent in passenger traffic. At the same time the new equipment has made possible a decrease of more than 10 per cent in the number of sections of the train necessary to handle the business, with resultant reduced operating costs.

Canadian National Opens New 100-Mile Branch Line

On December 3, with appropriate ceremonies, the Canadian National opened to traffic a new branch line 100 miles long through the heart of the Bell River-Rouyn gold and copper mining district of northwestern Quebec. The line extends in a southwesterly direction from Senneterre, Que., on the main line, and to a connection with a branch line of the Canadian National at Noranda, Que.

Train Accidents Decrease in First Half of 1938

Train accidents decreased 41 per cent on the railroads of the United States, during the first six months of 1938, as compared to the corresponding period of the previous year, according to the Bureau of Railway Economics of the Association of American Railroads. Casualties for all classes of persons were reduced by 440, or 17.6 per cent, in that period as compared to 1937, and nonfatal injuries were reduced by 5,211 or 28.6 per cent. The A.A.R. calls this "the best general safety record ever established by the railroads for any similar period."

Differ Over North Western Milwaukee Merger Plans

When the Interstate Commerce Commission, on December 15, heard oral arguments concerning the question of whether the reorganization cases of the Chicago & North Western and the Chicago, Milwaukee, St. Paul & Pacific should be reopened to allow testimony in favor of a plan for reorganization, contemplating the merger of these two roads, the stockholders and managements were in favor of such testimony even though such action should delay reorganization for several years, while the bondholders contended that if any consolidating were to be done, it should be consummated only after the two properties had been reorganized and turned over to the bondholders. The plan for the consolidation of these two roads was filed with the Interstate Commerce Commission on October 26, by protective committees for the preferred stockholders of the Milwaukee and the common stockholders of the North Western, recommending a merger of these roads on a basis whereby both bond and stockholders would participate in the new company to be formed. In the plan it was estimated that savings of over $10,000,000 per year would be realized.

Railroads Should Spend One Billion Each Year

R. V. Fletcher, vice-president and general counsel of the Association of American Railroads declared before the Senate Finance Committee that, during the next five years, the railroads could profitably spend one billion dollars annually for new freight cars, and locomotives, repair of existing equipment and improvement in track and facilities. He discussed the advisability of amending the tax laws to permit such expenditures being taken into consideration in computing the taxes to be paid by the railroads. He also stated that such an expenditure for rehabilitation purposes would be in the public interest for the reason that it would not only bring about increased efficiency in railroad operation but would provide employment for approximately half a million persons in industry as well as increase the number of railroad employees to a considerable extent.

New Type Steam Electric Locomotive for Union Pacific

A new steam turbine-electric locomotive has been built by the General Electric Company for the Union Pacific, which departs radically from the conventional form of steam locomotive. Rated at 5000 h.p., it is designed to haul a 12-car train of Pullman and standard passenger cars between Chicago and the Pacific Coast, handling this train over 2.2 per cent grades without a helper in temperatures ranging from 40 deg. below zero to 115 deg. above. Among the features of this locomotive are a thermal efficiency from fuel to the driving wheels more than double that of the conventional steam locomotive; electric braking, resulting in savings in brake shoes and tires, not only for the locomotive, but for the entire train; high rates of acceleration and braking due to high adhesive weight; capacity for 500 to 700-mile performance without stops for fuel or water; elimination of corrosion and boiler scale due to use of distilled water in a closed system, and complete elimination of unbalanced reciprocating parts.

New Diesels on Seaboard Air Line

Three 6,000-hp. Diesel-electric streamlined locomotives, the longest and most powerful yet designed, were placed in service on Orange Blossom Special of the Seaboard Air Line between Washington, D. C., and Miami, Fla., on December 15. These locomotives, which are 210 ft. long, and weigh 900,000 lb., consist of three 2,000-hp. units coupled together. Each of these units carries 1,200 gal. of fuel oil, and 1,100 gal. of water to cool the engines and heat the train.

President's Railroad Committee of Six

A unanimous report was submitted to President Roosevelt on December 23 by his railroad committee-of-six which included Carl R. Gray, vice-chairman of the Union Pacific, M. W. Clement, president of the Pennsylvania, E. E. Norris, president of the Southern, George M. Harrison, chairman of the Railway Labor Executives Association, D. B. Robertson, president of the Brotherhood of Locomotive Firemen and Enginemen and B. M. Jewell, president of the Railway Employees Department of the American Federation of Labor. The chief recommendations of this committee were briefly as follows: that an independent National Transportation Board be set up to study the several competing modes of transportation, that he Inerstate Commerce Commission aind the National Transportation Board regulae all forms of transportation, that a single court be set up for handling railroad reorganizations, that the rate making rule be revised to cover all forms of transportation, that governmental subsidies to competing forms of transportation be eliminated, that land grant rates be repealed and that restrictions be lightened on he securing of funds from the Reconstruction Finance Corporation.

Personal Mention

General

J. N. Todd, assistant engineer on the Southern, with headquarters at Washington, D.C., has been appointed superintendent of scales, with the same headquarters.

E. T. Barrett, engineer of track of the Denver & Rio Grande Western, with headquarters at Denver, Colo., has been granted a leave of absence to become superintendent of the Rio Grande Southern, a temporary position.

H. G. Watkins, superintendent and chief engineer of the Akron, Canton & Youngstown, with headquarters at Akron, Ohio, has been appointed general superintendent and chief-engineer, with the same headquarters, with jurisdiction over transportation, engineering, maintenance of way, and maintenance of equipment.

J. H. Forbes, assistant right-of-way agent of the Canadian Pacific, and formerly assistant district engineer of this company, has been promoted to right-of-way and lease agent, with headquarters at Montreal, Que., succeeding to a portion of the duties of **Frank Taylor,** right-of-way and tax agent and formerly a division engineer on the C.P.R., who retired on December 31.

Robert R. Cummins, assistant general manager of the Central of Georgia, with headquarters at Savannah, Ga., and an engineer by training and experience, has been promoted to general manager, succeeding **C. E. Weaver,** whose death on November 27 is reported elsewhere in this issue. Mr. Cummins was born on September 30, 1884, at Marion, Ala., and graduated from the University of Alabama in 1906. He entered the service of the Central of Georgia on September 1, 1909, and except for his service with the A.E.F. as a first lieutenant in the Engineer Corps in France, has been continuously with that company since that date. Mr. Cummins first served as a draftsman and was successively promoted to instrumentman, assistant engineer, supervisor of bridges and buildings, assistant trainmaster and roadmaster. On December 1, 1927, he was appointed superintendent of the Savannah division and on October 1, 1931, became superintendent of maintenance of way. He served in this capacity until 1933, when he was promoted to general manager, which position he filled from July 15, 1933, to June 22, 1936, while Mr. Weaver was on leave of absence to serve as Southern regional director for the federal co-ordinator of transportation. On the latter date Mr. Weaver returned to the service of the Central of Georgia and Mr. Cummins was appointed assistant general manager, the position he held until his recent appointment.

Robert R. Cummins

P. D. Fitzpatrick, chief engineer of the Grand Trunk Western, with headquarters at Detroit, Mich., has been promoted to general manager, with the same headquarters. Mr. Fitzpatrick was born at Springfield, Ill., and was educated at Armour Institute of Technology at Chicago. He entered railway service in 1901 on track elevation work with the Chicago & North Western, later going with the Illinois Central as an assistant engineer. In 1905, Mr. Fitzpatrick left railway service to become superintendent and engineer with a general railroad construction firm and seven years later he became an assistant engineer for the Kansas City Terminal Railroad, Kansas City, Mo., on the construction of the Kansas City Terminal. In May, 1913, he became connected with the engineering department of the Grand Trunk Western on the construction of the terminal at Bay City, Mich., and the following October, he was appointed division engineer in charge of construction on the Southern New England (a project of the Central Vermont, later discontinued). In February, 1916, he was appointed valuation engineer of the Central Vermont, later being assigned the added duties of general roadmaster. In 1918, Mr. Fitzpatrick was advanced to chief engineer, which position he held until the spring of 1930, when he was placed in charge of the large terminal project of the Canadian National at Montreal, Que., as assistant chief engineer. Upon the termination of this work in August, 1932, he was appointed to the position of chief engineer of the Grand Trunk Western, with headquarters at Detroit.

P. D. Fitzpatrick

Harry R. Younger, an engineer by training and experience, whose promotion to superintendent of the Kettle Valley division, British Columbia district, of the Canadian Pacific, with headquarters at Penticton, B. C., was announced in the December issue, was born at Montreal, Que., on November 18, 1885, and attended Ottawa Collegiate and McGill University, Montreal, graduating in civil engineering from the latter institution in 1910. He entered railway service in April, 1906, as a rodman in the maintenance of way department of the Canadian Pacific at Ottawa, Ont., and later served between terms of school as a chainman and a transitman on construction work in Saskatchewan and in the maintenance of way department at Montreal. In 1910, Mr. Younger was appointed instrumentman and resident engineer on the location and construction of the Kootenay Central branch in British Columbia and in 1915, he was appointed assistant engineer on the Intercolonial Railway (now part of the Canadian National) at Levis, Que. In 1916, he was assigned to the Laboratory of Gauges and Standards of the Imperial Ministry. He returned to the service of the Canadian Pacific as a transitman on the Vancouver division in 1920, and in 1923, he was advanced to assistant engineer in charge of the concrete lining of the Connaught tunnel at Glacier, B. C. Two years later, Mr. Younger was promoted to roadmaster of the Revelstoke division, and in 1928 he was advanced to division engineer of the Kootenay division, with headquarters at Nelson, B. C., the position he held until his recent promotion.

Major F. L. C. Bond, general manager of the Central region of the Canadian National, with headquarters at Toronto, Ont., and an engineer by training and experience, has been advanced to vice-president and general manager of that region with the same headquarters.

F. L. C. Bond

Major Bond was born at Montreal and began his railway career upon graduation from the Science Faculty of McGill University in 1898 as assistant to the resident engineer, Eastern division, Grand Trunk system. In 1901 he became engineer in charge of the double track construction and from January to March of the following year gained additional experience

with the New York Central as night superintendent on the construction of its underground entrance to the Grand Central Terminal. Returning in April of that year to the engineering department of the Grand Trunk, he became resident engineer until 1913, when he was made division engineer, Eastern lines. After service overseas with the 10th Battalion, Canadian Railway Troops, Major Bond was appointed chief engineer of the Grand Trunk and upon the amalgamation of the Grand Trunk with the Canadian National system, was transferred to Toronto as chief engineer of the Central region. He held that position until April, 1924, when he was transferred to Montreal as general superintendent of the Montreal district. In June, 1936, he returned to Toronto as general manager of the Central region and now has been appointed vice-president as well as general manager of that region.

Engineering

G. A. Haggander, bridge engineer of the Chicago, Burlington & Quincy, with headquarters at Chicago, has had his jurisdiction extended over the Colorado & Southern and the Ft. Worth & Denver City, subsidiaries of the Burlington.

T. P. O'Neill, engineer of maintenance of way of the Colorado & Southern, with headquarters at Denver, Colo., has had his jurisdiction extended over the Fort Worth & Denver City and the Wichita Valley.

T. S. Pattison, assistant division engineer on the Chesapeake & Ohio, at Chillicothe, Ohio, was promoted to division engineer, with headquarters at Covington, Ky., effective December 1, succeeding **D. Hubbard,** who has been assigned to other duties.

A. F. White has been promoted to engineer of the Toronto, Hamilton & Buffalo, with headquarters at Hamilton, Ont., and will assume the duties heretofore performed by **R. L. Latham,** chief engineer, whose death on November 12 was reported in the December issue.

William F. Cummings, assistant chief engineer of the Boston & Maine and the Maine Central, was appointed acting chief engineer of these companies on December 19, with headquarters as before at Boston, Mass., to serve in the absence of **Asa H. Morrill,** chief engineer, who was off duty because of ill health. As reported elsewhere in these columns, Mr. Morrill died on December 20.

J. F. Shaffer, assistant engineer in the office of the assistant to the executive vice-president of the Chesapeake & Ohio, with headquarters at Cleveland, Ohio, has been appointed superintendent of terminals at Chicago, effective January 1. In this appointment, Mr. Shaffer succeeds to a position which has been vacant since the death of **J. A. Barker** on November 27, 1937.

G. M. Darby, division engineer on the Denver & Rio Grande Western, with headquarters at Grand Junction, Colo., has been appointed engineer of track, with headquarters at Denver, Colo., succeeding **E. T. Barrett,** whose temporary appointment as superintendent of the Rio Grande Southern is noted elsewhere in these columns and **H. C. Cosand,** division engineer, with headquarters at Salt Lake City, Utah, has been transferred to Grand Junction, replacing Mr. Darby. **H. J. Willard,** roadmaster, with headquarters at Helper, Utah, has been appointed division engineer at Salt Lake City, relieving Mr. Cosand and **A. L. Kleine** has been appointed roadmaster at Helper, succeeding Mr. Willard.

Owen Crawford, whose promotion to division engineer of the Nashville Terminals of the Louisville & Nashville and the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., was announced in the November issue of *Railway Engineering and Maintenance,* was born in London, England, on March 21, 1878, and attended Franklin Preparatory School, Cincinnati, Ohio, and Yale University. He entered railway service in the summer of 1901 as a rodman in the engineering departemnt of the Louisville division of the L. & N., and in 1902, was promoted to instrumentman. He was advanced to assistant engineer on the Nashville division in 1905, and in 1912, he was promoted to roadmaster of the New Orleans and Mobile division, with headquarters at Bay St. Louis, Miss. Mr. Crawford was further advanced to roadmaster and

Owen Crawford

assistant division engineer of the Montgomery and New Orleans division, with headquarters at Mobile, Ala., in September, 1931, the position he held at the time of his recent promotion.

Arthur Montzheimer, chief engineer of the Elgin, Joliet & Eastern, with headquarters at Joliet, Ill., retired on December 31, and **Frank H. Masters,** assistant chief engineer with the same headquarters, has been advanced to chief engineer, succeeding Mr. Montzheimer. **F. G. Campbell,** special engineer, has been promoted to assistant chief engineer, succeeding Mr. Masters.

Mr. Montzheimer was born at Sharpsburg, Pa., on January 23, 1869, and attended the Dixon College of Civil Engineering at Dixon, Ill. In 1886, he entered railway service as a roadmaster's clerk on the Chicago & North Western at Eagle Grove, Iowa, and after attending college during the following two years, returned in 1888 to a similar position on the North Western at Sterling, Ill. In 1889, he was appointed a rodman in the engineering department and he was later promoted to instrumentman. In 1891, he was promoted to assistant engineer and served in that capacity at various points in Illinois and Wisconsin. Mr. Montzheimer was promoted to superintendent of bridges and

Arthur Montzheimer

buildings, with headquarters at Milwaukee, Wis., in 1895, and in 1903, he left the North Western to become chief engineer of the Elgin, Joliet & Eastern and the Chicago, Lake Shore & Eastern (now a part of the E. J. & E.) with headquarters at Joliet. During the period of federal control of the railroads, he also served as chief engineer of the Chicago, Milwaukee & Gary. Mr. Montzheimer has long been active in various railroad and engineering associations including the American Railway Bridge and Building Association of which has was president in 1904 and the American Railway Engineering Association, of which he was a director from 1927 to 1930, and a chairman for three years of the Yards and Terminals Committee.

Mr. Masters was born in Clinton County, Ind., on June 30, 1879, and graduated from the University of Indiana in 1902, and from Cornell University in civil engineering in 1904. He first entered railway service during the summer of 1903 as a rodman in the maintenance of way department of the Baltimore & Ohio, and on July 1, 1906, he entered the service of the Chicago & North Western as a rodman. One month later, he went with the Elgin, Joliet & Eastern as an assistant engineer and on January 1, 1913, he was promoted to division engineer and superintendent of bridges and buildings, with headquarters at Gary, Ind. Mr. Masters was appointed division engineer, with the same headquarters, on June 1, 1914, and on April 1, 1918, he was advanced to assistant chief engineer, with headquarters at Joliet.

Mr. Campbell was born at Meade, Kan., on May 9, 1891, and attended Kansas State Agricultural College. He entered railway service in April, 1911, with the Joliet Union Depot Company, and in November of that year he went with the Kansas City Southern as a rodman. In September, 1912, he was promoted to transitman and two months later he went

with the Chicago, Milwaukee & St. Paul as an instrumentman, later becoming a resident engineer and assistant engineer. From March, 1918, to October, 1918, he served with the Corps of Engineers, U. S. Army, and in November, 1918, returned to the Milwaukee as an assistant engineer. He was promoted to cost engineer in April, 1923. From March, 1926, to December, 1926, he went with Mr. Mark W. Potter on appraisal of the Consolidated Railroads of Cuba. In January, 1927, he was appointed assistant valuation engineer of the Elgin, Joliet & Eastern, with headquarters at Joliet, and two years later he was promoted to valuation engineer. Mr. Cambell was appointed special engineer in August, 1933, the position he held at the time of his recent promotion.

John E. Armstrong, assistant chief engineer of the Canadian Pacific, has been promoted to chief engineer, effective January 1, with headquarters as before at Montreal, Que., to succeed **J. M. R. Fairbairn,** who has retired under the company's pension plan. **F. W. Alexander,** engineer maintenance of way of the Western lines, with headquarters at Winnipeg, Man., has been promoted to assistant chief engineer, with the same headquarters, to succeed Mr. Armstrong.

Mr. Alexander was born at Fredricktown Junction, N. B., on November 22, 1878, and entered railway service in June, 1897, in the chief engineer's office of the Bangor & Aroostook, later serving in various capacities in the engineering department of that road, including resident engineer on construction. In 1903, he was on location work for the Restigouche & Western (now part of the Canadian National system), and later in the year entered the service of the Canadian Pacific as a transitman at Moose Jaw, Sask. Since then he has been division engineer at Calgary, Alta., and Cranbrook, B. C., and district engineer at Calgary and Vancouver, B. C. Mr. Alexander was promoted to engineer of maintenance of way of the Western lines, with headquarters at Winnipeg, in August, 1927.

F. W. Alexander

V. H. Carruthers, whose promotion to division engineer of the Portage division, Manitoba district of the Canadian Pacific, with headquarters at Winnipeg, Man., was announced in the November issue of *Railway Engineering & Maintenance,* was born at Harcourt, N. B., on June 27, 1893, and attended Mount Allison Academy and the University of Toronto, graduating from the latter in 1923. He entered railway service in 1913, on preliminary location work with the Canadian National and remained with that road until 1916, when he resigned to serve overseas with the Canadian army. On returning from the war in 1919, Mr. Carruthers became a transitman on the Canadian Pacific and served in this position on the Saskatoon and the Moose Jaw division, later being transferred to Kenora, Ont., In 1925, he was appointed extra gang foreman on new line construction, and later in that year, he was promoted to roadmaster, with headquarters at Virden, Man. In February, 1926, he was transferred to the Fort William, Ont., terminals, and from July of the same year until May, 1927, he served as roadmaster on the Kettle Valley (part of the Canadian Pacific) with headquarters at Princeton, B. C. On the latter date, he was transferred to Weyburn, Sask., and on December 1, 1930, he was promoted to division engineer of the Portage division with headquarters at Winnipeg. He was later appointed roadmaster at Weyburn, and in January, 1934, he was transferred to the Saskatoon division, with headquarters at Lanigan, Sask. On April 16, 1936, Mr. Carruthers was appointed acting division engineer with headquarters at Saskatoon, Sask., and on October 16, 1936, he returned to his position as roadmaster at Lanigan, which he held until his recent promotion.

V. H. Carruthers

Track

R. M. Niekirk, track supervisor on the Indianapolis Union Railway, with headquarters at Indianapolis, Ind., has retired from active service at the age of 65, following 29 years service with that company.

James A. Pennock, whose retirement as roadmaster on the Canadian National, with headquarters at Regina, Sask., was announced in the October issue, was born at Young Mills, Ont., on July 20, 1873, and entered railway service in May, 1888, as a water boy on the Grand Trunk. He worked as a section laborer the following two summers and became a regular section hand on May 1, 1892. On July 13, 1899, he was promoted to section foreman and served as a section and extra gang foreman until April, 1911. On May 22, 1911, he entered the service of the Canadian Northern (now part of the Canadian National System) as extra gang and yard foreman between Saskatoon and Regina. He left the Canadian Northern to go with the Grand Trunk Pacific (part of the Canadian National) on August 1, 1913, as extra gang and yard foreman at Northgate, Sask., and on May 1, 1917, he was promoted to roadmaster, with headquarters at Regina.

William Peterson has been appointed supervisor of track on the Toledo division of the Michigan Central, with headquarters at Detroit, Mich., succeeding **J. A. Snyder,** who has been transferred to the Bay City division, with the same headquarters, relieving **Fred Cram,** who retired on December 31.

W. G. Pfohl, assistant supervisor of track on the Pennsylvania at Newport, Pa., has been promoted to supervisor of track on the Renovo division, with headquarters at Kane, Pa. **W. B. Blix,** has been appointed assistant supervisor on the Middle division at Newport, to succeed Mr. Pfohl.

W. F. Smock, assistant supervisor of bridges and buildings on the Southern, with headquarters at Birmingham, Ala., has been promoted to track supervisor on the Mobile division, with headquarters at Selma, Ala., succeeding **J. R. Brosman,** who, in turn, has been appointed assistant supervisor of bridges and buildings at Birmingham, replacing Mr. Smock.

Martin J. Bielema, section foreman on the Galena division of the Chicago & North Western, has been promoted to roadmaster, with headquarters at Wall Lake, Iowa, succeeding **John Roszak,** who has been transferred to Antigo, Wis., replacing **H. C. Krause.** Mr. Krause has been transferred to Milwaukee, Wis., to relieve **E. C. Jones,** who retired on December 31.

J. H. Logan, roadmaster on the Chicago, Rock Island & Pacific at Pratt, Kan., has been transferred to Iowa Falls, Iowa, succeeding **George W. Kohn,** who has retired. Mr. Logan was replaced at Pratt by **W. A. Gunderson,** as announced in the November issue.

Mr. Kohn was born at Naperville, Ill., and entered railway service in April, 1888, as a section laborer on the Chicago, Burlington & Quincy. On April 4, 1892, he was promoted to section foreman and served in this capacity on the Burlington until 1905 with the exception of two years from 1901 to 1903 when he was in train service as a brakeman. On August 16, 1905, he went with the Rock Island as section foreman and on December 1, 1909, he was appointed wrecking master. Mr. Kohn was appointed switch inspector for the First district on July 7, 1911, and three months later he was promoted to roadmaster.

A. O. Martin, whose promotion to roadmaster on the Chicago, Rock Island & Pacific, with headquarters at Peoria, Ill.,

was announced in the December issue, was born at Sigourney, Iowa, on November, 1, 1899, and entered railway service on August 16, 1917, as a section laborer on the Rock Island at Delta, Iowa. In 1923, he was transferred to Sigourney, and on August 9, 1924, he was promoted to section foreman at Nepas, Iowa. After serving in this capacity at various points, he was advanced to track supervisor, with headquarters at Cedar Rapids, Iowa, on October 1, 1935, and was later transferred to Cedar Falls. On August 16, 1937, he was transferred to Manly, Iowa. On April 15, 1938, he was appointed acting roadmaster from Des Moines to Davenport, Iowa, and ten days later he was transferred to the Rock Island division as acting roadmaster from Bureau, Ill., to Joliet, the position he held at the time of his recent promotion.

H. R. Draper, supervisor of ditchers on the Hinton division of the Chesapeake & Ohio, has been promoted to supervisor of track of the Nicholas, Fayette & Greenbrier district, with headquarters at Rainelle, W. Va., succeeding **C. E. Butcher,** who has been transferred. **W. J. Butler,** assistant cost engineer on the Ashland division has been appointed supervisor of track of the Barboursville district, with headquarters at Huntington, W. Va., succeeding **R. R. Burchett,** who has been transferred to the Huntington district, with headquarters at Huntington, succeeding **J. L. Brightwell,** who has retired. **H. G. Bowles,** supervisor of ditchers on the Huntington division, has been promoted to supervisor of track of the Charleston district, with headquarters at St. Albans, W. Va., succeeding **J. Henzman,** retired. **R. Milner,** assistant cost engineer of the Northern sub-division, has been promoted to supervisor of track of the Logan district, with headquarters at Peach Creek, W. Va., succeeding **O. M. Smith,** resigned.

Mr. Butler was born on May 3, 1900, at Columbus, Ohio, and after a public school education, entered railway service on February 19, 1920, with the Hocking Valley (part of the Chesapeake & Ohio) at Columbus. For seven years he was engaged in clerical work in the maintenance of way department of this company, being advanced to assistant cost engineer on January 1, 1927. On May 19, 1929, he was transferred to the Ashland division.

Mr. Bowles has been indentified with the C. & O. continuously for nearly 29 years. He was born on January 17, 1894, at Portersville, W. Va., and after a public school education, entered railway service with the C. & O. on March 7, 1910, as a section laborer on the Logan division. Three years later he became a section foreman on the same division, and on December 1, 1920, he was appointed an extra force foreman on the Huntington division. He was advanced to ditcher supervisor on the same division on March 1, 1926, and after about three years in this capacity, he became system tool inspector for the valuation department. On October 1, 1929, Mr. Bowles returned to the Huntington division as ditcher supervisor, being transferred to the Hinton division on January 15, 1932, and thence to the Huntington division on August 14, 1934.

Mr. Milner was born on July 9, 1903, in Jefferson County, Ohio, and obtained his engineering education at Ohio State University. He entered railway service with the C. & O. on January 1, 1927, as an assistant cost engineer. In this capacity he has served at Walbridge, Ohio, Logan, and Chillicothe, being stationed at the latter point at the time of his recent appointment as supervisor of track.

Bridges and Building

D. W. Isaacs, bridge and building foreman on the Missouri-Kansas division of the Chicago, Rock Island & Pacific, has been promoted to master carpenter, with headquarters at El Reno, Okla., succeeding **A. H. Sturdevant,** who has been assigned to other duties.

Frank J. Miles, bridge and building foreman on the Galesburg division of the Chicago, Burlington & Quincy, has been promoted to master carpenter, with headquarters at Galesburg, Ill., succeeding **J. P. Buckley,** who has been transferred to Chicago replacing **George A. Wiegel,** who retired on October 1. **William Ascott,** assistant master carpenter, with headquarters at Beardstown, Ill., has been promoted to master carpenter, with headquarters at Aurora, Ill., relieving **L. Smith,** who has been assigned to other duties, and **J. J. Walsh,** bridge and building foreman on the Hannibal division, has been advanced to assistant master carpenter, with headquarters at Beardstown succeeding Mr. Ascott.

Obituary

Elvin A. Deal, who retired in 1924 as acting bridge engineer of the Delaware, Lackawanna & Western, died on December 2, at Troy, N. Y., after a long illness.

Peter A. Friess, who retired as roadmaster of the Lake Shore division of the Chicago & North Western, with headquarters at Fond du Lac, Wis., in October, 1931, died at his home at that point on December 5.

A. L. Robinson, supervisor of bridges and buildings of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., died in the Southern Pacific hospital at San Francisco, Cal., on December 4, after an illness of several months.

John N. Penwell, retired bridge and building supervisor of the Lake Erie & Western (now Nickel Plate), with headquarters at Tipton, Ind., died at that point on December 7. Mr. Penwell was president of the American Railway Bridge and Building Association in 1914.

Thomas E. O'Brien, who retired on July 1 as bridge and building master of the Delaware & Hudson, with headquarters at Carbondale, Pa., died suddenly at that point on November 16. Mr. O'Brien first entered railway service on the New York, Ontario & Western, and in 1902 went with the D. & H. as a carpenter. He was later promoted to foreman and general foreman, and in 1918 he was advanced to bridge and building master.

C. E. Weaver, general manager of the Central of Georgia, with headquarters at Savannah, Ga., and an engineer by training, died in Savannah on November 27, at the age of 61. Mr. Weaver was born at Newark, N. J., on January 7, 1877, and was educated at Woodstock Academy (Woodstock, Conn.) and the Sheffield Scientific School of Yale University. He entered railroad service in 1899 as assistant engineer on the Mexican International (now part of the National of Mexico), in which capacity he served until 1906, when he became resident engineer for the Sonora Railway (now part of the Southern Pacific of Mexico). He was also appointed resident engineer of the

C. E. Weaver

Cananea, Yaqui River & Pacific (now part of the S. P. of Mexico) in 1908 and the following year he became engineer maintenance of way, of the Sonora Railway and the Southern Pacific of Mexico. From March to June, 1911, he was resident engineer on construction for the Illinois Central, later becoming roadmaster.

In 1913 he was appointed district engineer on the Southern lines of the Illinois Central. He was appointed engineer maintenance of way on the Central of Georgia in 1916, and in 1926 was promoted to chief engineer of the road. In July, 1931, Mr. Weaver was appointed assistant general manager and chief engineer and in May, 1933, became general manager and chief engineer. For a time he served as Southern regional director on the staff of Joseph B. Eastman, federal co-ordinator of transportation, with headquarters at Atlanta, Ga., returning to the Central of Georgia in July, 1936.

William H. Brown, assistant supervisor of track on the Reading, with headquarters at Reading, Pa., and for many years a supervisor, with headquarters at Pine Grove, Pa., died suddenly of heart trouble on December 16. Mr. Brown was born at Shenandoah, Pa., on December 13, 1874, and graduated from Lehigh University. He entered railway service in 1896 in the engineering department of the Philadelphia & Reading (now the Reading) and on April 16, 1900, he was appointed assistant supervisor of track at Pottsville, Pa. Mr. Brown was advanced to supervisor, with headquarters at Pine Grove, on October 23, 1905, and after a period of illness in 1932, was appointed assistant supervisor, with headquarters

successively at Harrisburg, Pa., Pottstown, Pa., and Reading.

Harry J. Armstrong, retired chief engineer of the Missouri & North Arkansas, and at one time general superintendent of transportation and maintenance of way of that road, died of a heart attack at his home in Harrison, Ark., on November 19. Mr. Armstrong entered railway service in 1879, with the Atchison, Topeka & Santa Fe, and was employed on construction work in the Southwest with that road and later with the Chicago, Rock Island & Pacific. In the spring of 1916, he went with the Missouri & North Arkansas as a resident engineer and later became division engineer with headquarters at Harrison, Ark. In the spring of 1920, he was promoted to chief engineer, and two years later he was advanced to general superintendent of transportation and maintenance of way. In March, 1926, he was again appointed chief engineer and served in that capacity until the spring of 1931.

Asa H. Morrill, chief engineer of the Boston & Maine and the Maine Central, with headquarters at Boston, Mass., died on December 20, at the Maine Central hospital at Portland, Me. Mr. Morrill was born on October 7, 1870, at Concord, N. H., and was educated at Massachusetts Institute of Technology, graduating in 1892. Immediately after his graduation, Mr. Morrill entered railroad service as an assistant engineer on the Buffalo, Rochester & Pittsburgh. Later in the same year he entered the service of the New York, New Haven & Hartford as an assistant engineer, being appointed assistant roadmaster two years later. In 1898 he became associated with the contracting firm of Charles McDermitt as superintendent, but shortly thereafter re-entered the engineering department of the New Haven. In 1907, Mr. Morrill became assistant engineer of construction for the

Asa H. Morrill

Maine Central and in 1928 he became advanced to chief engineer of this company. In April, 1933, he assumed the added duties of assistant chief engineer of the Boston & Maine and early in 1936 he became acting chief engineer of both the Boston & Maine and the Maine Central. On July 13, 1936, Mr. Morrill was named chief engineer of both roads, which position he held until his death.

Association News

Railway Tie Association

President Meyer Levy contemplates calling a meeting of the Executive committee at Washington, D. C., during the week of the convention of the American Wood Preservers Association, at which time it is expected that a definite decision will be reached regarding the holding of a convention next spring.

Metropolitan Track Supervisors Club

The last meeting of the club, which was held on December 8 in conjunction with the annual dinner of the New York Railroad Club, was attended by 85 members and guests and was the largest meeting that this club has held for a number of years. The meeting was addressed by A. A. Cross, division engineer, New York, New Haven & Hartford, Hartford, Conn., and H. F. Fifield, engineer maintenance of way, Boston & Maine, Boston, Mass., who described the damage that occurred on their respective roads during the recent flood and hurricane disaster and the work of rehabilitation.

Maintenance of Way Club of Chicago

Drainage was the subject considered at the December 19 meeting of the club, when, following dinner at 6:30 p.m., Harry E. Cotton, drainage specialist of the Armco Culvert Manufacturers Association, addressed the meeting on Stabilizing the Roadbed Through Subdrainage. Forty-eight members and guests were in attendance.

The next meeting, to be held on Monday, January 23, will begin with the usual dinner at 6:30 p.m., and will be addressed by A. L. Bartlett, engineer maintenance of way, New York, New Haven & Hartford, and H. F. Fifield, engineer maintenance of way, Boston & Maine, both of whom will discuss the havoc wrought by the recent New England hurricane and floods and the rehabilitation work carried out to restore lines to service.

Bridge and Building Association

Members of the Executive committee met in Chicago on December 6 with President A. Chinn, Vice-Presidents A. E. Bechtelheimer, H. M. Church and R. E. Dove, Directors F. H. Soothill, and B. R. Myers, Secretary C. A. Lichty, and Past-Presidents C. M. Burpee and Elmer T. Howson in attendance. President Chinn presented a letter requesting the appointment of representatives of the association to confer with members of other railway and railway supply associations regarding a proposal to consolidate exhibits and asked Past-President C. R. Knowles to serve with him as the representative of this association. Plans were developed looking to the publication of a news bulletin bi-monthly. K. T. Batchelder, president of the Bridge and Building Supply Men's Association, was also present by invitation during a portion of the session and stated that it is the present intention of his association to present an exhibit next year in connection with the convention.

Eleven applications for membership were received and approved. The committee then gave extended consideration to the selection of members to serve on committees to prepare reports for the next convention.

Roadmasters Association

Members of the Executive committee met in Chicago on December 3 with Vice-President F. B. LaFleur, Secretary C. A. Lichty, Treasurer E. E. Crowley, Directors E. L. Banion, A. B. Hillman, R. L. Sims and R. S. Kniffen and Past-President Elmer T. Howson in attendance. Lem Adams, president of the Track Supply Association, was also present for a portion of the meeting. The resignation of A. H. Peterson as president, tendered by reason of extended illness, was presented and was accepted with regret, Vice-President LaFleur being appointed president to succeed Mr. Peterson.

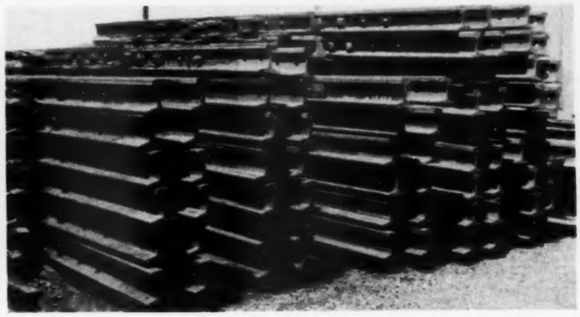
The report of the committee appointed to make hotel arrangements for the next convention, recommending that the Hotel Stevens be selected for the 1939 convention, was approved. In accordance with the provisions of the constitution, the amendment presented by Past-President C. W. Baldridge at the closing session of the last convention, looking to the fixing of Chicago as the permanent headquarters for the association, was referred to the committee on the revision of the constitution, consisting of A. Chinn, C. W. Baldridge and W. S. Lacher. Past-Presidents H. R. Clarke and C. W. Baldridge were appointed to confer with representatives of other railway and supply associations on a proposal to consolidate exhibits.

Twenty-four applications for membership were received and approved. The committee then gave extended consideration to the selection of committees to prepare reports for the next convention.

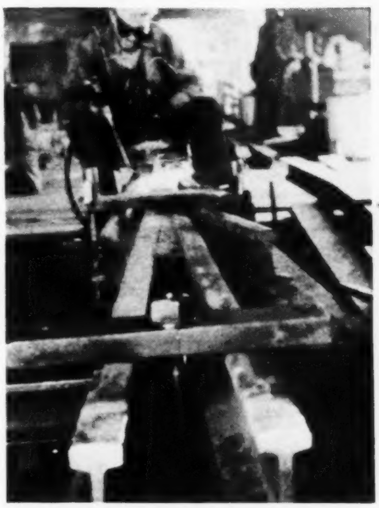
Wood Preservers Association

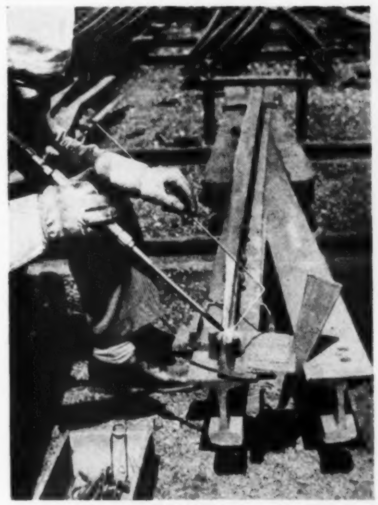
The thirty-fifth annual convention will be held at the Hotel Willard, Washington, D.C., on January 24-26. In addition to the consideration of reports dealing with the improvement of the technique of wood preservation, the session on Wednesday morning, termed a Users' Day Session, will be devoted to the presentation of addresses by officers of industries using treated timber in quantity, setting forth the results of such use Among those who will appear on this program are W. H. Bettis, maintenance engineer, Norfolk & Western, who will speak on The Experience of the Norfolk & Western with Treated Timber, and G. F. Eberly, assistant maintenance engineer, Baltimore & Ohio, who will speak on What the Baltimore & Ohio Has Learned from the Treatment of Timber Other Than Cross and Switch Ties. On Tuesday evening a program will be presented on

FROG AND SWITCH POINT RECLAMATION



...is another profitable practice for railroads





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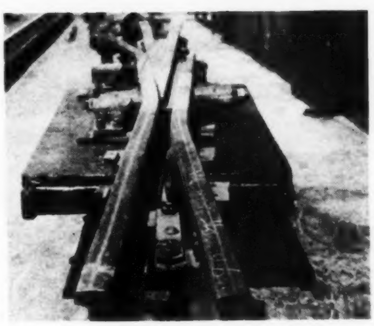

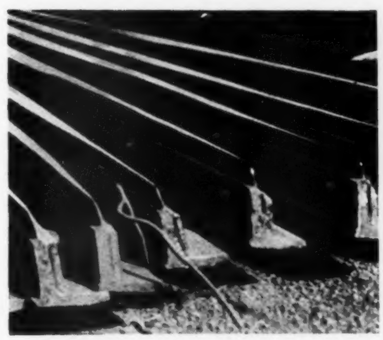

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The Use of Treated Timber in Government Construction, at which a number of federal officers, engaged in construction activities involving the use of treated timber, will present their experiences regarding the use of this material.

Plans are being made for those traveling to the convention through the Chicago and St. Louis gateways to go by special train, leaving on Sunday afternoon, over the C.C.C. & St.L.-N. & W.-R.F. & P., stopping en route to visit the N. & W. plant at Radford, Va., and the plant of L. A. Clarke & Son near Fredericksburg, Va., and arriving at Washington on Monday evening.

Ballots have been distributed to the members containing the selections of the nominating committee for officers for the year beginning with the conclusion of the convention on January 26, 1939, as follows:

For President—C. S. Burt—General Tie and Treatment Inspector—Illinois Central—Grenada, Miss.

For First Vice-President—R. E. Meyers—Manager of Sales—International Creosoting & Construction Company—Galveston, Texas.

For Second Vice-President—W. R. Goodwin—Engineer Wood Preservation—Minneapolis, St. Paul & Sault Ste. Marie—Minneapolis, Minn.

For Treasurer—H. L. Dawson.

For Members of the Executive Committee—W. J. Burton—Assistant to Chief Engineer—Missouri Pacific—St. Louis, Mo.; W. P. Conyers, Jr.,—Vice-President and Treas., Taylor-Colquitt Co.—Spartanburg, S.C.

American Railway Engineering Association

In Bulletins Nos. 406 and 407, the membership now has 13 of the reports to be presented at the convention in Chicago in March. The remaining 14 reports will be issued in two other Bulletins, Nos. 408 and 409, the first of which will be mailed during the last week in January. This bulletin will contain the reports of the Committees on Wood Bridges and Trestles, Masonry, Iron and Steel Structures, Records and Accounts, Impact, Waterproofing of Railway Structures, and Economics of Bridges and Trestles.

As the work on all committee reports is practically completed, no committee meetings have been scheduled for January, and only two committees held meetings during December, these being the Committee on Water Service, Fire Protection and Sanitation, which met at New York on December 7, and the Committee on Rail, which met at that point on December 8.

As the result of action of the Nominating committee, which met at New York on December 9, the following names will appear on the ballot that is to be mailed shortly to members: President, E. M. Hastings, chief engineer, Richmond, Fredericksburg & Potomac, Richmond, Va.

Vice-President, F.L.C. Bond, vice-president and general manager, Central

Vice-President, F. L. C. Bond, vice-president and general manager, Central region, Canadian National Rys., Toronto, Ont.

Directors (three to be elected), R. C. Gowdy, chief engineer, Colorado & Southern, Denver, Colo.; Robert Faries, assistant chief engineer-maintenance, Pennsylvania, Philadelphia, Pa.; C. P. Richardson, engineer capital expenditures, Chicago, Rock Island & Pacific, Chicago; H. Austill, chief engineer, Mobile & Ohio, St. Louis, Mo.; F. P. Turner, principal assistant engineer, Norfolk & Western, Roanoke, Va.; G. R. Smiley, chief engineer, Louisville & Nashville, Louisville, Ky.; J. B. Akers, assistant chief engineer, Southern, Washington, D. C.; F. W. Alexander, assistant chief engineer, Canadian Pacific, Winnipeg, Man., and C. E. Smith, vice-president, N.Y.N.H.&H., New Haven, Conn.

Members of the Nominating committee (five to be elected), M. J. J. Harrison, supervisor of scales and weighing, Pennsylvania, Altoona, Pa.; H. M. Church, general supervisor bridges and buildings, Chesapeake & Ohio, Richmond, Va.; A. C. Shields, Washington, Iowa; G. H. Trout, bridge engineer, Union Pacific, Omaha, Neb.; J. A. Lahmer, senior assistant engineer, Missouri Pacific, St. Louis, Mo.; R. C. White, assistant general manager, Missouri Pacific, St. Louis, Mo.; W. B. Irwin, assistant to vice-president, Great Northern, St. Paul, Minn.; J. F. Pringle, general superintendent, Central region Canadian National Rys., Toronto, Ont., Canada; Elmer T. Howson, vice-president and western editor, Railway Age, Chicago; and G. F. Hand, general assistant engineer, New York, New Haven & Hartford, New Haven, Conn.

In addition to the above names to be balloted upon, Geo. S. Fanning, chief engineer, Erie, Cleveland, Ohio, will be advanced automatically to senior vice-president.

Supply Trade News

J. B. Peddle has been appointed sales representative of the **Morden Frog and Crossing Works** in the St. Louis, Mo., territory.

S. A. Crabtree and **W. J. Jack** have been appointed assistant district sales managers of the **Republic Steel Corporation** in the Chicago territory.

Claude R. Kingsbury, Seattle, Wash., has taken over the territory formerly handled for the **Ohio Brass Company,** Mansfield, Ohio, by **J. W. Watkins.**

Walter Jehu, general manager of the Timken Roller Bearing Company, Ltd., Toronto, Ont., has been appointed district manager of the **Timken Roller Bearing Company,** at Boston, Mass.

Thomas Toby who was formerly connected with the **National Lock Washer Company,** Newark, N. J., has become affiliated with the **Pittsburgh Screw & Bolt Corporation** as a sales representative in the New York office.

Alan E. Ashcraft, vice-president of **Fairbanks Morse & Company,** with headquarters at Beloit, Wis., has been appointed, effective January 1, vice-president in charge of the operations in seven plants, with headquarters at Chicago.

A. C. Heath, has been appointed manager of railroad sales of the **Woolery Machine Company,** Minneapolis, Minn. Mr. Heath was formerly with the Woolery Machine Company and prior to that time was with the **American Hoist & Derrick Company,** with headquarters at St. Paul, Minn., and at Chicago. Later he organized the **Heath Railway Supply Company,** St. Paul, representing a number of railway supply manufacturers in that territory, including the **Handlan-Buck Manufacturing Company,** the **Kalamazoo Railway Supply Company,** the **Ames Shovel & Tool Company,** the **Hauck Manufacturing Company** and the **Midwest Forging Company.**

A. C. Heath

Avery C. Adams, manager of sales, sheet division, of the Carnegie-Illinois Steel Corporation, Pittsburgh, Pa., has resigned to become vice-president and assistant general manager of sales of the **Inland Steel Company, Chicago.** Mr. Adams was employed by the Trumbull Steel Company, Warren, Ohio, in various capacities from 1919 to 1928. He resigned from this company as assistant general manager of sales in May of the latter year to become manager of the tin plate division of the Republic Steel Corporation. In July of the same year, he entered the employ of the General Fireproofing Company in Youngstown, Ohio, as vice-president in charge of sales. In June, 1936, he became manager of sales of the sheet division of the Carnegie-Illinois Steel Corporation, Pittsburgh, Pa.

Avery C. Adams

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TRACK MAINTENANCE MACHINERY

ALPHABETICAL INDEX TO ADVERTISERS